

# The effect of abstract versus concrete thinking on decision-making in depression

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**THE EFFECT OF ABSTRACT VERSUS CONCRETE THINKING  
ON DECISION-MAKING IN DEPRESSION**

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Bachelor of Psychology (Hons)

A thesis submitted in partial fulfillment of the requirements for the degree of  
Master of Psychology (Organisational) and Doctor of Philosophy



School of Psychology  
Faculty of Science

July 2018

Abstract thinking is characteristic of depressed individuals, as is the tendency to experience difficulties with decision-making. This thesis investigated whether: (i) abstract thinking is associated with decision-making problems, and (ii) inducing a converse more adaptive style of thinking, namely concrete thinking, could lead to more constructive outcomes in the decision-making process. Study 1 first compared the extent to which high dysphoric and low dysphoric individuals naturally engaged in abstract thinking while completing decision-making tasks. As predicted, high dysphoric participants demonstrated more abstract thinking and worse outcomes on decision-making measures indexed before and after they made decisions about both personal and hypothetical scenarios. Studies 2 to 6 then tested the prediction that in comparison to concrete thinking, abstract thinking leads to worse outcomes across a number of stages of decision-making. Study 2 tested the length of time taken for participants who received either an abstract or concrete thinking induction to complete an online writing task that they were instructed to complete as early as possible. Depressive symptoms were associated with longer task completion time in the abstract condition; no such relationship was observed in the concrete condition. Studies 3 and 4 then tested the relative effects of abstract versus concrete thinking on the likelihood of committing to proactive choice options. In both studies, high dysphoric participants demonstrated greater levels of behavioural proactivity following a concrete thinking induction as compared to an abstract thinking induction. Study 5 and 6 tested whether thinking abstractly about a decision that one had previously made but regretted led to higher levels of post-decisional regret compared to thinking about the decision in a concrete manner. Study 5 found that abstract thinking led to higher levels of post-decisional regret than concrete thinking. Study 6 replicated these findings and additionally yielded post-hoc evidence to suggest that abstract thinking increases post-decisional regret by encouraging more upward counterfactual thoughts, as compared to concrete thinking. Together these studies indicate that abstract thinking could play an important role in contributing to decision-making problems in depression, and raise the clinical possibility that encouraging depressed individuals to engage in concrete thinking could alleviate these problems.

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## PUBLICATIONS AND PRESENTATIONS

All six studies in this thesis have been accepted/currently under review for publication. A number of the studies have also been presented at conferences and thesis competitions.

### Manuscript currently under review for publication:

#### Study 1 & 2:

Dey, S., Newell, B. R., & Moulds, M. L (under second review). The relative effects of abstract versus concrete thinking on decision-making in depression. *Behaviour Research and Therapy*.

### Manuscripts accepted for publication:

#### Study 3 & 4:

Dey, S., Newell, B. R., & Moulds, M. L. (in press). The relative effects of abstract versus concrete processing on proactivity in depression. *Behavior Therapy*.

#### Study 5 & 6:

Dey, S., Joormann, J., Moulds, M. L., & Newell, B. R. (2018). The relative effects of abstract versus concrete rumination on the experience of post-decisional regret. *Behaviour Research and Therapy*, 108, 18-28.

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- Dey, S., Newell, B. R., & Moulds, M. L. (2017). *Using rumination to improve proactivity in depression*. Oral presentation and poster. UNSW Science Faculty Postgraduate Research Competition. \*Awarded School of Psychology Prize.
- Dey, S., Moulds, M. L., & Newell, B. R. (2017). *The effect of rumination on decisional proactivity in dysphoria*. Paper presented at the 12<sup>th</sup> Biennial Conference of the Society for Applied Research in Memory and Cognition, Sydney, Australia.
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- Dey, S., Moulds, M. L., & Newell, B. R. (2015). *The effect of abstract versus concrete thinking on procrastination in depression*. Paper presented at the Sydney Postgraduate Psychology Conference, Sydney Australia.
- Dey, S., Newell, B. R., & Moulds, M. L. (2014). *The effect of manipulating construal level on decision-making*. Oral presentation. Paper presented at the Sydney Postgraduate Psychology Conference, Sydney Australia. \*Awarded People's Choice Award.
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## ABSTRACT

Abstract thinking is characteristic of depressed individuals, as is the tendency to experience difficulties with decision-making. This thesis investigated whether: (i) abstract thinking is associated with decision-making problems, and (ii) inducing a converse more adaptive style of thinking, namely concrete thinking, could lead to more constructive outcomes in the decision-making process. Study 1 first compared the extent to which high dysphoric and low dysphoric individuals naturally engaged in abstract thinking while completing decision-making tasks. As predicted, high dysphoric participants demonstrated more abstract thinking and worse outcomes on decision-making measures indexed before and after they made decisions about both personal and hypothetical scenarios. Studies 2 to 6 then tested the prediction that in comparison to concrete thinking, abstract thinking leads to worse outcomes across a number of stages of decision-making. Study 2 tested the length of time taken for participants who received either an abstract or concrete thinking induction to complete an online writing task that they were instructed to complete as early as possible. Depressive symptoms were associated with longer task completion time in the abstract condition; no such relationship was observed in the concrete condition. Studies 3 and 4 then tested the relative effects of abstract versus concrete thinking on the likelihood of committing to proactive choice options. In both studies, high dysphoric participants demonstrated greater levels of behavioural proactivity following a concrete thinking induction as compared to an abstract thinking induction. Studies 5 and 6 tested whether thinking abstractly about a decision that one had previously made but regretted led to higher levels of post-decisional regret compared to thinking about the decision in a concrete manner. Study 5 found that abstract thinking led to higher levels of post-decisional

regret than concrete thinking. Study 6 replicated these findings and additionally yielded post-hoc evidence to suggest that abstract thinking increases post-decisional regret by encouraging more upward counterfactual thoughts, as compared to concrete thinking. Together these studies indicate that abstract thinking could play an important role in contributing to decision-making problems in depression, and raise the clinical possibility that encouraging depressed individuals to engage in concrete thinking could alleviate these problems.

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## **CHAPTER 1: Introduction**

Individuals suffering from depression often demonstrate significant impairments in decision-making (DSM-5; American Psychiatric Association, 2013; Leykin & DeRubeis, 2010). While there is considerable research on the types of decision-making difficulties that are common in depression, minimal research has investigated the source of these difficulties. One potential cause that has been proposed in the literature is abstract ruminative thinking, a common and unconstructive style of thinking in depression (Watkins, 2016). Following from the idea that abstract thinking may contribute to decision-making difficulties in depression is the possibility that shifting depressed individuals into adopting the converse, more adaptive style of thinking (i.e., concrete thinking) may alleviate these difficulties. The extant literature currently contains only one study on the relative effects of abstract versus concrete thinking on decision-making in depression. Accordingly, the present thesis represents a much-needed program of research that aimed to delineate the relative influence of these two thinking styles on decision-making in depression. A greater understanding of this topic has the potential to inform theory as well as to elucidate cognitive processes that are of clinical value to target in the management of depression.

This introductory chapter will commence with an overview of the nature of the disorder and the need to better identify the factors that contribute to the maintenance of its symptoms. Decision-making difficulties will be presented as a symptom of depression that requires further research. The chapter will then provide a review of the existing literature on decision-making problems in depression, followed by a review of studies that suggest that an abstract ruminative style of thinking might play an important role in contributing to these problems. Empirical evidence of the negative effects of

abstract thinking versus the relatively positive effects of concrete thinking will next be presented.

The chapter will then proceed to make a case for the need to investigate the relative effects of abstract versus concrete thinking on decision-making in depression. Theoretical support for the hypothesised effects will first be offered, followed by a presentation of a limited body of supporting empirical evidence. The Introduction will then conclude with an outline of how the current research program aims to increase the current understanding of the potential influence of these two thinking styles on decision-making in depression.

## **Depression**

Depression is a profoundly debilitating mood disorder and currently one of the most common forms of psychopathology. It is estimated that over 300 million people worldwide suffer from the disorder, with a prevalence increase of 18.4% between the year 2005 and 2015 (World Health Organisation, 2017). Characteristic symptoms of the disorder include a persistent negative mood, feelings of hopelessness and worthlessness, an impaired ability to think or concentrate, indecisiveness, a tendency to withdraw from all or most activities, and a constant sense of low energy and fatigue (DSM-5; American Psychiatric Association, 2013). These symptoms impair the sufferer's emotional, motivational, cognitive, social, and physical wellbeing and can lead to or become associated with dangerous ideations, behaviour, and living conditions (for a review, see Kessler, 2012). For example, there is evidence that depression predicts suicide attempts, substance abuse, unemployment, loss of income, as well as chronic illnesses including hypertension, diabetes, heart disease, and cancer (Barth, Schumacher, & Herrmann-Lingen, 2004; Davidson, Jonas, Dixon, & Markovitz, 2000; Kawakami, Takatsuka,

Shimizu, & Ishibashi, 1999; Nanayakkara, Misch, Chang, & Henry, 2013; Pennix et al., 1998; Rihmer, 2007; Rugulies, 2002; White, Xie, Thompson, Loeber, & Stouthamer-Loeber, 2001; Whooley et al., 2002).

The negative effects of depression also extend beyond the depressed individual. For example, there is evidence that depressed individuals display a wide range of social deficits including increased withdrawal behaviours and diminished cooperativeness (Clark, Thorne, Hardy, & Cropsey, 2013, Derntl et al., 2011; Kupferberg, Bicks, & Hasler, 2016). There is also evidence that depression is a risk factor for negative parenting behaviours (Wilson & Durbin, 2010) and associated with marital dissatisfaction (O’Leary, Christian, & Mendell, 1994; Whisman, 1999). Moreover, the disorder presents enormous burden to the workplace. In Australia alone, depression is estimated to annually cost employers a total of \$8 billion due to decreased work productivity (McTernan, Dollard, & LaMontagne, 2013). The burden of this disorder is clearly significant on an individual, social, and economic level. In fact, depression was recently ranked as the leading cause of disability worldwide (World Health Organisation, 2017).

Considering the growing prevalence and adverse consequences of this disorder, it is an issue of public health importance to conduct research that aims to better understand symptoms of depression in order to help prevent and treat this condition. It is important to not only understand the consequences of depression symptoms, but also to identify the factors that maintain them. The identification of factors that contribute to the maintenance of depressive symptoms is a necessary step for designing targeted interventions. To date, little research has been conducted to elucidate the process/es that

contribute to the persistence of a particular symptom of depression, namely, impaired decision-making (DSM-5; American Psychiatric Association, 2013).

### **Decision-making**

Decision-making is a cognitive process that is fundamental to all aspects of everyday life. It is estimated that individuals make hundreds of decisions on a daily basis (Milosavljevic, Koch, & Rangel, 2011). These decisions can range from minor ones, such as determining which candy bar to purchase, to major ones, such as choosing which career path to pursue. Minor or major, the decisions of individual determine, or at least influence, the wellbeing, mistakes, learning, achievements, and future experiences of themselves or others. For example, becoming a vegetarian might improve one's health. Reading more books should increase one's knowledge. Drinking while driving can end someone's life.

For over four decades, decision-making has been as topic of investigation in both psychology and management disciplines. Researchers have aimed to understand the way in which individuals proceed through successive stages of the decision-making process, the factors that influence the decision process, and the effects that different types of decisions can have on one's personal life, social group, and physical and organisational environment (for reviews see Barberis, 2013; Ford & Richardson, 1994; Steptoe-Warren, Howat, & Hume, 2011; Swami, 2013). This field of research has produced a growing number of models and theories aimed at capturing the multi-faceted process of decision-making (Beresford & Sloper, 2008).

One generally agreed upon definition of decision-making in this literature is that the process of making a decision involves an evaluation of choice options in order to commit to the most preferred option (Busemeyer & Johnson, 2004). Traditional

normative theories of decision-making state that decision-makers objectively assess the expected utility of each option, and rationally choose the option with the greatest expected utility (Edwards, 1954; von Neumann & Morgenstern, 1944). However, there is growing evidence to refute this view of the decision-making process as entirely logical (Hilbert, 2012). Subjective factors such as emotions and cognitive biases can strongly influence the decision maker's assessment of each option (Erasmus, Boshoff, & Rousseau, 2001; Kahneman, 2003; Swami, 2013; Virlics, 2013). For example, when faced with the task of deciding whether or not to attend a social event, a pessimistic individual might focus on the potential cons of attending (e.g., not finding anyone to talk to) rather than the potential pros (e.g., having a good time), and as a result choose not to attend the event.

### **Decision-making in Depression**

The findings of research on decision-making in depression highlight that depressed individuals often demonstrate such a negative cognitive bias during their decision-making process. For example, an early study by Pietromonaco and Rook (1987) found that high dysphoric individuals (that is, individuals who scored highly on a measure of depressive symptoms) tend to assign greater weight to the potential risks, but not the potential benefits, of making a decision than do low dysphoric individuals. Specifically, high dysphoric participants rated the potential risks of making a decision as more likely to occur, more important, and more hurtful in the decision dilemmas.

In line with evidence that depressed individuals tend to focus on the potential negative outcomes of making a decision, Leykin (2008) demonstrated that they also tend to think of more negative words such as 'frustration' and 'submission', and experience more intrusive negative images during the decision-making process (Leykin,

2008). Depressive symptoms are also positively associated with greater levels of self-report ratings of anxiety and stress around decision-making (Leykin & DeRubeis, 2010; Radford, Mann, & Kalucy, 1986; Radford, Nakane, Ohta, Mann, & Kalucy, 1991).

There is also evidence to suggest that depressed individuals tend to feel less capable of making decisions. For example, individuals with elevated levels of depressive symptoms show a diminished reliance on their personal intuitions during decision-making, take longer to arrive at a decision, report low self-esteem as a decision-maker, display less confidence in their decisions, and report a tendency to procrastinate or avoid making decisions altogether (Leykin & DeRubeis, 2010; Leykin, Roberts, & DeRubeis, 2011; Murphy et al., 2001; Okwumabua, Wong, & Duryea, 2003; Radford et al., 1986).

Perhaps depressed individuals question their decision-making abilities because they recognize that they tend to engage in maladaptive decision-making styles. A number of early cognitive models of depression (Beck, 1967, 1976; Beck, Emery, & Greenberg, 1985) emphasised the tendency of depressed individuals to engage in automatic and implicit biased-information processing. Indeed, compared to non-depressed individuals, depressed individuals demonstrate attentional bias towards negative information (e.g., focusing on the possibility of failure) and a decreased ability to disengage from negative information (Baert, & De Raedt, & Koster, 2009; Bradley, Mogg, & Lee, 1997; Ellenbogen & Schwartzman, 2009; Goeleven, De Raedt, Baert, & Koster, 2006). There is also evidence that depressed individuals report difficulty in being able to control their tendency to ruminate (Nolen-Hoeksema, 1987). Given this biased and seemingly uncontrollable information-processing style in depression, it is therefore not surprising that researchers have found depressive symptomatology to be



associated with the following unhelpful decision-making styles: gathering incomplete information about the choice options, processing the choice options in a negatively biased way, depending on others in order to make a decision, and ultimately making decisions that yield poor outcomes (Leykin & DeRubeis, 2010; Leykin et al., 2011; Radford et al., 1986; van Randenborgh, de Jong-Meyer, & Huffmeier, 2010). Examples of poor decisions that are common in depression include withdrawing from normal everyday tasks, avoiding potentially rewarding activities, and engaging in harmful behaviour and thinking styles (Kupferberg et al., 2016; Schwartz & Petersen, 2016).

A handful of studies suggest that depression is also linked with a tendency to lament past decisions (Kraines, Krug, & Wells, 2017; Leykin & DeRubeis, 2010; Monroe, Skowronski, Macdonald, & Wood, 2005). For example, there is evidence that in comparison to non-depressed individuals, mildly depressed individuals (Monroe et al., 2005) as well as individuals who meet criteria for major depressive disorder (Kraines et al., 2017) report higher levels of regret over past decisions. Interestingly, the study by Monroe and colleagues (2005) demonstrated that mildly depressed individuals regretted the decisions that they made on a hiring task more than the non-depressed individuals, irrespective of which decision they actually made.

Overall, the above-mentioned findings suggest that individuals with depressive symptoms struggle with the entire decision-making process. Compared to non-depressed individuals, they experience more negative affect during the decision-making process, feel as though they are less capable of making a decision, think about choice options in sub-optimal ways, tend to make poorer decisions, and then suffer the consequences of their poor decisions such as by experiencing high levels of post-decisional regret.

It may be the case that these extensive deficits in decision-making in depression contribute to the persistence of the disorder. Difficulties with decision-making may reinforce a depressed individual's negative self-perception, for example, by making them feeling even more incapable of positively shaping their future (Leykin et al., 2011). Their poor decisions may also remind them of similar poor decisions they made in the past, generate feelings of guilt and shame, and increase their feelings of hopelessness and worthlessness. Furthermore, struggles with the decision-process might lead to or reinforce depressed individuals' tendency to avoid decision-making altogether, which could in turn contribute to low motivation to engage in potentially rewarding activities in the future (Monroe et al., 2005).

Overall, there is considerable research demonstrating that decision-making is a significant problem in depression and hence an important area for clinicians to target. However, in order to target this problem, research needs to be conducted that will enable a better theoretical understanding of the source/s of, and factors that contribute to, decision-making difficulties in this population. That is, a better understanding of the factors responsible for decision-making problems in depression is needed to help to inform the design of clinical interventions aimed at reducing them. To date, little research of this kind has been carried out. One idea of relevance to the need for such research is that rumination, a style of thinking that is characteristic of depressed individuals, may play a key role in contributing to decision-making problems in depression.

### **Rumination in Depression**

Rumination is passive repetitive thinking about one's self, concerns, and experiences (Nolen-Hoeksema, 1991). For depressed individuals, ruminative thinking

centers on one's depressive symptoms and is a cognitive strategy adopted to try to make sense of those symptoms (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). According to Nolen-Hoeksema's (1991) Response Style Theory (RST), depressive rumination is a maladaptive response to depressed mood that likely exacerbates current depressive symptoms (e.g., sad mood) and predicts the development, duration, and severity of future depressive episodes. This theory has been strongly supported by the findings of a number of longitudinal studies (e.g., Just & Alloy, 1997; Nolen-Hoeksema, 2000; Sarin, Abela, & Auerbach, 2005; for a review see Nolen-Hoeksema et al., 2008). For example, Just and Alloy (1997) found that participants who reported a tendency to ruminate in response to depressed mood were more likely to experience a depressive episode over the following 18 months compared to participants who reported a tendency to distract themselves from their depressed mood. Another study demonstrated that the higher participants' self-reported tendency to engage in rumination, the greater the duration of their depressed mood over thirty days, over and above baseline symptoms (Nolen-Hoeksema et al., 1993).

The RST is also supported by the findings of a considerable number of experimental studies that demonstrate the negative effects of depressive rumination on a range of tasks and variables. For example, rumination results in increased negative thinking about the future, impaired cognitive performance, and worsened mood (e.g., Donaldson & Lam, 2004; Lavender & Watkins, 2004; Lyubomirsky & Nolen-Hoeksema, 1993; Rimes & Watkins, 2005, Study 3; Watkins & Baracaia, 2002). Many of these effects are relevant to and presumably disruptive to one's ability to engage in constructive decision-making. Some of these experimental studies are described in more detail below.

There is experimental evidence that depressive rumination, compared to distraction, worsens problem-solving performance and interferes with the ability to engage in functional behaviour. In one early study, dysphoric participants were either administered a rumination induction (i.e., instructed to focus their attention on thoughts that were emotion focused, symptom focused, and self-focused, e.g., “think about what your feelings might mean”) or a distraction induction (i.e., instructed to focus on thoughts that were not related to internal emotions, symptoms, or the self, e.g., “imagine a double decker bus outside”) (Lyubomirsky & Nolen-Hoeksema, 1995, Study 3). Participants in the rumination condition generated less effective solutions to a set of interpersonal conflict scenarios than did participants in the distraction condition. In another study, dysphoric participants who were allocated to the rumination condition perceived their personal problems as worse and less solvable, and rated themselves as less likely to implement the solutions that they generated for their personal problems, relative to dysphoric participants who were allocated to the distraction condition (Lyubomirsky, Tucker, Caldwell, & Berg, 1999, Study 1).

There is also evidence that following a rumination induction, compared to a distraction induction, dysphoric individuals rated themselves as less likely to engage in potentially-rewarding distracting activities (e.g., spending time with friends), even though there was no between-condition difference in participants’ ratings of the extent to which they believed that the activities would be enjoyable (Lyubomirsky & Nolen-Hoeksema, 1993). The experimenters suggested that rumination might make depressed individuals believe that they are less capable of performing pleasant activities by generating thoughts that highlight their tendency to be passive, lethargic, and apathetic.

Overall, the depression literature highlights rumination as a key cognitive

problem in depression. Given its role in the disorder, rumination is thus worthy of examination as a potential driver of decision-making deficits. The current literature on the link between rumination and decision-making will now be reviewed.

### **The Role of Rumination in Decision-making in Depression**

To date, only a handful of studies have examined the relationship between rumination and decision-making in the wider literature, let alone in the literature on depression. The findings of the studies that have been conducted thus far, within and outside of depression research, converge to support the notion that rumination is problematic in decision-making. Two studies found that rumination creates an inflexible mindset to the extent that in comparison to non-ruminators, ruminators are less able to provide effective solutions to different problems (Lyubomirsky et al., 1999, Study 3) and less able to adjust to changing task demands (Davis & Nolen-Hoeksema, 2000). In line with those findings, there is also evidence that rumination is positively correlated with indecision (Cohen & Ferrari, 2010) as well as a greater tendency to appraise one's problem as unsolvable (Lyubomirsky & Nolen-Hoeksema, 1993, Study 1). Another study demonstrated that ruminators, compared to non-ruminators, feel less confident and less committed to their decisions (Ward, Lyubomirsky, Sousa, & Nolen-Hoeksema, 2003). Perhaps of most relevance to this thesis however are the findings of a rumination study conducted with dysphoric individuals (van Randenborgh et al., 2010). In this study, high dysphoric participants who completed a rumination induction found the decision-making process to be more difficult and felt less confident about their decision, as compared to the low dysphoric participants who were administered a rumination induction and to both the high and low dysphoric participants who were administered the distraction induction.

Taken together, the findings of the abovementioned studies are consistent in suggesting that rumination interferes with the decision-making process. However, an even more specific and interesting commonality of these studies is the type of rumination assessed in the studies. Specifically, an examination of the instructions used to induce rumination in the studies mentioned above reveals that the experimenters had induced or measured a particular type of rumination, namely, abstract rumination.

Abstract rumination is arguably one of the most common thinking processes in depression (Watkins, 2016), and involves repeatedly thinking about the higher-order aspects of a situation, such as the reasons for and implications of a situation (Watkins, 2004). In depression, the content of such thoughts are usually negative, and focused on one's negative emotions and the meanings and consequences of the negative emotions (Nolen-Hoeksema et al., 2008; Watkins, 2008). Common abstract ruminative thoughts in depression include '*why do I always feel so down?*', '*what is wrong with me?*' and '*why can't I handle this better?*' (Watkins, 2008). This style of thinking is in direct contrast to concrete rumination, which is an atypical thought process among depressed individuals that involves thinking about low-level specific details of a situation (Watkins, 2004). Examples of concrete ruminative thoughts include '*what occurred in this situation?*', '*how did it happen?*', and '*what steps can I take to resolve the problem?*' (Watkins, 2008). The literature on the relative effects of abstract versus concrete rumination will now be reviewed. This review will highlight the importance of distinguishing these two very different forms of rumination when attempting to better understand decision-making problems in depression.

### **Abstract versus Concrete Ruminative Thinking**

Before presenting findings on the nature of abstract versus concrete ruminative thinking in depression, it is important to first outline the Construal Level Theory (CLT; for a review see Trope & Liberman, 2010). According to CLT, individuals form mental representations which vary in level of abstraction, ranging from high-order abstract thinking to low-level concrete thinking. Abstract thinking consists of general, evaluative and decontextualized mental representations of a scenario that are aimed at capturing the overall purpose, meaning, and implications of the scenario. By comparison, concrete thinking consists of context-specific mental representations of a scenario, aimed at inferring the situation-specific state of participating in the scenario and the ‘how’ details of going about the process of actually engaging in the scenario.

For decades social psychology researchers have drawn on CLT to investigate the relative effects of these two styles of thinking. Interestingly, much of this literature has found that in unselected samples of participants (i.e., participants who were not selected based on their level of depressive symptoms) abstract thinking can yield positive effects relative to concrete thinking. For example, abstract thinking has been shown to generate stronger intentions to exert self-control (Fujita, Trope, Liberman, & Levin-Sagi, 2006), a greater sense of personal power (Smith, Wigboldus, & Dijksterhuis, 2008), and an increased likelihood of engaging in behaviour that is consistent with one’s personal values (Giacomantonio, De Dreu, Shalvi, Sligte, & Leder, 2010). Importantly, however, the depression literature has demonstrated a converse pattern of findings. That is, in the context of depressed mood, an abstract style of thinking leads to more negative outcomes relative to a concrete style of thinking.

The contrasting effects of abstract versus concrete ruminative thoughts in depression are perhaps best understood in the context of Watkins' (2004) distinction between abstract and concrete processing. Watkins proposed that for depressed individuals, adopting a high-level processing mode (i.e., thinking in an abstract way) leads to worse outcomes than adopting a low-level processing mode (i.e., thinking in a concrete way). Specifically, Watkins highlights that engaging in a high-level abstract processing mode in depression is congruent with the thinking style observed in depressive rumination, and that through a number of mechanisms, abstract processing produces more harmful effects in depression than concrete processing. For example, Watkins (2004) proposed that abstract ruminative thinking increases negative overgeneralisations and exacerbates emotional reactivity. Consistent with Watkins' theory, a number of studies in the clinical literature have demonstrated the adverse outcomes of abstract ruminative thinking<sup>1</sup> relative to concrete thinking. The findings of these studies are outlined below.

There is evidence that abstract thinking leads to a number of maladaptive outcomes. In depressed individuals, there is evidence that abstract thinking increases negative future thinking (Lavender & Watkins, 2004) and promotes negative global self-evaluations (Rimes & Watkins, 2005). A number of studies have shown that abstract thinking worsens social problem solving in depression (e.g., Watkins & Baracaia, 2002; Watkins & Moulds, 2005). Abstract thinking also dampens executive functioning in dysphoric individuals by reducing their ability to ignore irrelevant

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The terms 'abstract ruminative thinking' and 'abstract thinking' have been used interchangeably in the depression literature. For the sake of brevity, abstract thinking will be used from here on.



information during mental activities that require strategic thinking (Philippot & Brutoux, 2008).

The abovementioned negative consequences of engaging in abstract thinking in depression are in contrast to the relatively positive effects of concrete thinking. For example, there is evidence that depressed participants who received a concrete thinking induction reported less self-worthlessness and incompetency (Rimes & Watkins, 2005), reduced overgeneralized autobiographical memory (Watkins & Teasdale, 2001, 2004), and demonstrated better social problem solving (Watkins & Moulds, 2005), relative to depressed participants who received an abstract thinking induction. There is also evidence that recalling positive memories in an abstract way (i.e., focusing on the causes, meanings, and consequences of the recalled situation) maintains low mood in depressed and formerly depressed individuals, while recalling a memory in a concrete way (i.e., focusing on its specific details) improves mood (Werner-Seidler & Moulds, 2012).

Researchers have also demonstrated that concrete thinking reduces depressive symptoms and rumination in populations with dysphoria (Watkins, Baeyens, & Read, 2009) and depression (Watkins, Taylor, Byng, Baeyens, & Read, 2012). Watkins et al. (2009) found that training dysphoric individuals to adopt a concrete style of thinking in response to negative events significantly reduced levels of depression and rumination, as compared to control participants who received no training. Watkins et al. (2012) demonstrated in a clinical follow-up study that these benefits lasted for an even longer timeframe. Specifically, depressed patients who completed 8 weeks of concreteness training (in addition to the usual treatment they received from their primary care physician) demonstrated significantly lower levels of depression and rumination at post-

treatment, and at 3-month and 6-month follow-up, in comparison to depressed individuals who only received 8 weeks of their usual treatment. The concreteness training consisted of daily exercises that trained the patients to replace their habitual style of abstract thinking with a concrete style of thinking. Taken together, these findings demonstrate that in depression, abstract thinking has maladaptive effects whereas concrete thinking has relatively adaptive effects.

Given that decision-making necessitates that individuals engage in a thought process and that abstract thinking is a common and unconstructive thought process in depression, it is possible that abstract thinking might lie at the root of a number of decision-making problems faced by depressed individuals. This notion is supported by the findings of studies (reviewed above) that have already been conducted on the relationship between rumination and decision-making (e.g., Lyubomirsky & Nolen-Hoeksema, 1993; van Randenborgh et al., 2010). As previously noted, an abstract (as opposed to concrete) rumination induction was employed in those studies. Following from this possibility that abstract thinking contributes to decision-making problems in depression is the possibility that shifting depressed individuals into adopting the converse more adaptive style of thinking, namely concrete thinking, will alleviate their decision-making problems.

A number of researchers (Schiena, Luminet, Chang, & Philippot, 2013; Watkins, 2016) have recently proposed that the lack of concrete thinking and overuse of abstract thinking in depressed individuals underpins their difficulties with decision-making. They hypothesised that abstractly focusing on the general meanings and implications that a choice option may have for one's life is likely to be less helpful than focusing on the concrete steps that one needs to take in order to make a decision, or on the concrete

outcomes of the decision. Building on their hypothesis, a conceptual overview of the different ways in which abstract versus concrete thinking may contribute to decision-making difficulties in depression will now be proposed. The limited studies that have examined the effects of abstract versus concrete thinking on decision-making will then be presented before proceeding to outlining the gaps in the current literature.

### **The Potential Impact of Abstract versus Concrete Thinking on Decision-making**

When attempting to conceptualise the various ways in which abstract and concrete thinking styles can have an impact upon decision-making, it is useful to first consider decision-making as a process that consists of a number of stages. According to Heckhausen's Rubicon model (1987) when an individual makes a decision, she/he engages in a sequence of events which can be categorised into four distinct phases. Specifically, these include the pre-decisional phase (e.g., evaluating different choice options), the pre-actional phase (e.g., forming a goal intention), the actional phase (e.g., acting on one's goal intention), and the post-decisional phase (e.g., evaluating the effectiveness of one's actions). When considering the current literature on abstract versus concrete thinking in depression, it seems reasonable to propose that for depressed individuals abstract thinking may have a negative impact upon a number, if not all, of these stages of decision-making, as compared to concrete thinking.

Consider for example a depressed individual thinking about whether or not to apply for a new job. Adopting an abstract style of thinking during the decision process may generate thoughts such as *'Why should I go apply for the job?'* *'What would not getting the job say about me?'* *'What are the potential consequences of applying?'* On the other hand, concretely thinking about this decision scenario might invite thoughts like *'How do I apply for the job?'* *'What information do I need to collect?'* *'What steps*

*do I need to take to submit an application?*’ The process of actually making a decision requires concrete representations of the decision scenario, with attention focused on the available options and specific actions that an individual may need to take in order to arrive at a decision (Watkins, 2016). Abstract thinking may however bring about overly analytical representations of the scenario that are not conducive to arriving at a decision.

Given that abstract thinking is linked to worry (Stober & Borkovec, 2002; Stober, Tepperwien, & Staak, 2000) and found to increase negative thinking in depression (Rimes & Watkins, 2005), abstract representations of the decision scenario may elevate levels of stress and uncertainty during the evaluation of choice options. Abstractly thinking about the scenario may invite consideration of information that is not directly relevant to the task at hand (Philippot & Brutoux, 2008), and thereby delay the decision-maker from actually arriving at decision. Abstract thinking may also influence the decision outcome itself by increasing the likelihood of simply ‘choosing’ the default option (e.g., remaining in the same job instead of applying for a better one) due to difficulties in arriving at a decision about what to do.

Abstract thinking could also have a negative impact upon the later stages of the decision process. For example, abstract thinking might lead to higher levels of post-decisional regret than concrete thinking, especially considering that depressed individuals who ruminate on past decisions are likely to frequently entertain abstract thoughts about the decision, such as the implications, consequences, and meanings of one’s past actions. Furthermore, given its cross-situational nature, abstract thinking may also lend itself to increased counterfactual thinking when reflecting on past decisions. Counterfactual thoughts are mental representations of alternatives to past events, that is, thoughts of what could have been (e.g., *“if I hadn’t quit my job maybe my wife wouldn’t*

*have left me*"; Epstude & Roese, 2008). Studies have shown that counterfactual thoughts are associated with higher levels of regret (Epstude & Jonas, 2015; Tsiros & Mittal, 2000). The exhaustive and overly analytical nature of abstract thinking in depression may also lead to higher levels of decision-making avoidance or an increased need for the individual to seek out information about the alternative option/s that she/he did not choose. Overall, it is possible that relative to concrete thinking, abstract thinking yields negative effects on multiple stages of the decision process, from the decision process itself to post-decision cognitions and behaviours.

The possibility that abstract thinking is problematic in decision-making in comparison to concrete thinking has been tested in two studies conducted by Schiena et al. (2013). To the author's knowledge, Schiena and colleagues (2013) are the only researchers to date to have tested the relative effects of abstract versus concrete thinking on decision-making in the context of depression. They conducted two studies, the first correlational and the second experimental. Both studies are reviewed below.

### **Current Findings on the Relative Effects of Abstract versus Concrete Thinking on Decision-making**

In Schiena et al.'s (2013) first study, participants were instructed to complete a questionnaire that indexed whether they had a tendency to engage in a more concrete or more abstract style of thinking. Specifically, participants answered questions (e.g., *"When thoughts, feelings, situations, or events about me come to mind..."*) by selecting either an abstract response (*"I focus on the causes and meanings of what happened"*) or a concrete response (*"I seem to be engaged and directly in touch with what is going on around me"*). Participants also completed an indecisiveness scale, on which they rated items such as *"I try to put off making decisions"*. The results were consistent with

predictions; specifically, abstract thinking was positively correlated with indecisiveness whereas concrete thinking was negatively correlated with indecisiveness.

In the second study, participants were classified as high or low dysphoric (based on their scores on a self-report measure of depressive symptoms) and received either an abstract or concrete thinking induction. As part of this induction, all participants were asked to imagine personally experiencing ten listed scenarios, five of which were positive (e.g., succeeding in a job interview) and five of which were negative (e.g., being in a car accident). Participants in the abstract thinking condition were given the following instructions: *“the description provided is only a summary of what happened. Try not to think about details, but reflect more generally on the meaning this situation has for you and your life. Think about why the situation occurred and what it means and implies”*. Participants assigned to the concrete thinking condition were instructed to *“build up a detailed image of the situation, as if you were playing a movie of the event in your head. Spend a few moments imagining the scene as if you were really there, looking out into the scene. Imagine as vividly as possible what you could see, hear, feel, touch, and experience in that situation”*.

Following the abstract or concrete thinking induction, participants' were asked to choose between two choice options that related to an aspect of each of the ten scenarios that they had imagined during the thinking induction. For example, in the scenario for which they were asked to imagine attending a surprise party, they were asked to decide whether they would play calm or rhythmic music for the guests. Participants were informed that there was no correct response. The results of this study were consistent with the findings of the first study. Participants in the abstract thinking condition took longer to make a decision than did participants in the concrete thinking

condition. This pattern was observed for both high and low dysphoric participants. For high dysphoric participants, there was also a trend towards those in the abstract thinking condition to rate finding the process of making a decision more difficult than participants in the concrete thinking condition. There was no between-condition difference for the low dysphoric participants.

In line with the findings of Schiena et al. (2013) are the results of another three studies (McCrea, Liberman, Trope, & Sherman, 2008) that were conducted outside of the field of depression research. Across three studies, McCrea et al. (2008) tested the effects of abstract versus concrete thinking on an aspect of indecision, namely, procrastination. Participants were undergraduate students who were required to complete a questionnaire. In Studies 1 and 2 the questionnaire was presented in either an abstract thinking format (e.g., *write two sentences describing what characteristics are implied by the following activity: writing in a diary*) or a concrete thinking format (e.g., *write two sentences describing how one would go about the following activity: writing in a diary*). In Study 3 the questionnaire was presented following the depiction of a painting that primed either abstract or concrete thinking. The questionnaire required participants to make decisions related to the role of colour in art, and were identical for participants, irrespective of whether they received the abstract or concrete thinking prime. All participants were asked to complete the questionnaire within three weeks in order to receive their compensation for participating in the study. In all three studies, participants in the abstract and concrete conditions did not differ in their ratings of the difficulty, pleasantness, convenience, and importance of completing the questionnaire. However, in all three studies participants in the abstract condition were more likely to procrastinate (that is, take longer to return their completed questionnaire), as compared

to participants in the concrete condition. These findings suggest that relative to concrete thinking, abstract thinking impedes individuals from making a decision to commit to a course of action.

### **Limitations of the Existing Research**

Despite preliminary support for the proposal that that abstract thinking, but not concrete thinking, compromises decision-making in depression (McCrea et al., 2008; Schiena et al., 2013, Study 2), the existing research on the effects of abstract thinking on decision-making in depression has notable limitations that need to be addressed in future work. Firstly, there is a lack of studies that comparatively test the effects of abstract and concrete thinking on decision-making. As stated above, there is research examining the links between abstract rumination and decision-making, but hardly any research has specifically examined the problems that arise from the abstract ruminative thinking as compared to concrete ruminative thinking.

Furthermore, Schiena et al. (2013) are the only researchers to have tested the relative effects of the abstract versus concrete thinking on participants who were selected on the basis of their responses on a measure of depressive symptoms. As described above, their research yielded both significant and non-significant findings. In high dysphoric individuals, abstract (relative to concrete) thinking increased decision latency; there was only a trend however towards abstract thinking increasing decision difficulty. It is possible that more significant findings may have emerged had the researchers employed real-life decision scenarios as opposed to only hypothetical ones. Furthermore, their high dysphoric group included individuals who endorsed mild levels of depressive symptoms. The authors speculated that the two thinking styles would



yielded more contrasting effects in a sample of individuals with higher levels of depressive symptoms.

Given that only one study (i.e., Schiena et al., 2013, Study 2) has tested the comparative effects of abstract versus concrete rumination on decision-making in depression, the possibility that abstract thinking plays a role in decision-making problems that are common in depression and that concrete thinking might alleviate at least some of these problems essentially remains untested. The research questions that could be tested are extensive and important to consider. For example, does abstract thinking underlie depressed individuals' tendency to engage in dysfunctional decision-making styles (e.g., procrastinating from making a choice)? Could inducing a concrete style of thinking prompt them to engage in more proactive styles of decision-making? What role does abstract thinking play in the poor decisions they often make? Would they experience significantly less post-decisional regret if they adopted a more concrete style of thinking? From these research questions emerged the ideas tested in this thesis.

### **Aims of the Current Research Program**

The overarching aim of the current research program is to increase understanding of the relationship between abstract thinking and decision-making difficulties in depression. In particular, this thesis aims to clarify the role that abstract thinking may play in decision-making difficulties in depression, and whether inducing the converse style of concrete thinking may alleviate these difficulties. A total of six studies were conducted.

Study 1 was a correlational study that aimed to compare the extent to which high and low dysphoric individuals naturally engage in abstract versus concrete thinking during decision-making, and also to compare their decision-making tendencies. The

purpose of Study 1 was to establish within the same study whether high dysphoric individuals demonstrate elevated levels of both 1) abstract thinking during decision-making, and 2) difficulties with the decision-making process, in comparison to low dysphoric individuals. In doing so, this thesis aimed to commence with a clear indication that in the context of depression, abstract thinking is a common style of thinking that likely contributes to decision-making difficulties. Building on the findings of Study 1, a further five studies were conducted to assess the relative effects of abstract versus concrete thinking on three stages of decision-making that are known to be problematic in depression. These three stages were 1) decision latency: the length of time it takes to make a decision; 2) behavioural proactivity: the level of willingness to engage in self-initiated behaviour in response to a current or future situation; and 3) post-decisional regret: the level of regret experienced over an already-made decision. Table 1.1 summarises the decision-making stage, research question, design, and main comparison/manipulation of each study.

The source of decision-making difficulties in depression is not yet well understood. This thesis provides a much-needed empirical study of the relative impact of abstract versus concrete thinking on decision-making in the context of depression. The findings of this body of work have the potential to inform both clinical theory and interventions that aim to help address decision-making difficulties in depression.

Table 1.1  
*Summary of Research Program*

Study chapter	Decision stage	Main research question	Design	Main comparison/manipulation
<b>Chapter 2</b>	<b>Study 1</b>	Thought generation during decision-making	Correlational	High dysphoric participants were compared to low dysphoric participants on levels of abstract versus concrete thinking in their written responses to decision tasks.
	<b>Study 2</b>	Decision latency	Experimental	Participants were timed on an assigned writing task that they completed whilst adopting either an abstract or concrete thinking style.
<b>Chapter 3</b>	<b>Study 3</b>	Behavioural proactivity	Experimental	Participants completed a writing task that induced either abstract or concrete thinking about the idea of participating in an upcoming activity. Subsequent sign-ups to the activity were then indexed.
	<b>Study 4</b>	Behavioural proactivity	Experimental	Participants completed an abstract or concrete writing task about the idea of applying to their ideal part-time job. Behaviours that would maximise their chances of securing the job were then indexed.
<b>Chapter 4</b>	<b>Study 5</b>	Post-decisional regret	Experimental	Participants completed a writing task that induced abstract or concrete thinking about a past decision. Ratings of post-decisional regret were then indexed.
	<b>Study 6</b>	Post-decisional regret	Experimental (Replication)	Same as Study 5 but included an additional counterfactual thought generation task following the abstract or concrete thinking induction.

## **CHAPTER 2: The Relative Effects of Abstract versus Concrete Thinking on Decision-making in Depression**

The study by Schiena et al. (2013) is undoubtedly an important experiment such that it is the first to have tested the hypothesis that abstract thinking plays a causal role in decision-making problems in depression. However, it is reasonable to argue that there is a need for an even more preliminary step in this line of investigation; specifically, to assess the level of abstract thinking that naturally emerges when depressed or dysphoric individuals engage in decision-making. Whilst it is well established that abstract thinking is common in depression (Watkins, 2016), no study has explicitly examined whether abstract thinking is evident during decision-making in the context of depression. Evidence that abstract thinking is the default style of thinking that naturally emerges during decision-making in depression would provide a strong basis for conducting follow-up experimental studies that examine the relative effects of abstract versus concrete thinking on decision-making measures.

### **Study 1 – A Study of the Levels of Naturally Occurring Abstract versus Concrete Thinking adopted during Decision-making in Dysphoria**

Study 1 was conducted to examine levels of abstract versus concrete thinking that naturally emerge during decision-making for high dysphoric individuals, as compared to low dysphoric individuals. High dysphoric participants were tested in lieu of clinically depressed individuals on the basis of evidence that analogue versus clinically depressed samples differ quantitatively rather than qualitatively, and also given that findings in high dysphoric samples are generally similar in clinically depressed individuals (Cox, Enns, Borger, & Parker, 1999; Flett, Vredenburg, & Krames, 1997; Vredenburg, Flett, & Krames, 1993).

In Study 1, high and low dysphoric participants were instructed to write down the thoughts that came into their mind while they completed a number of decision-making tasks in the lab. Their written responses were then coded for levels of abstractness versus concreteness. Guided by the notion that abstract thinking may be underpinning decision-making problems in depression, the hypothesis was that high dysphoric participants would demonstrate more abstract thinking during decision-making than would low dysphoric participants, as well as worse outcomes on decision-making ratings items that were administered immediately before and after participants completed each decision task.

In Schiena et al.'s (2013) study, participants completed hypothetical decision tasks. In order to increase the ecological validity and clinical utility of the findings of the present study, Study 1 utilized personally-relevant decision tasks in addition to hypothetical decision tasks. The hypothesis was that the high dysphoric participants would report worse decision-making outcomes for both the personal and hypothetical scenarios. In line with the evidence that depressed individuals have a tendency to experience more difficulties than non-depressed individuals, it was also predicted that the high dysphoric group would report worse outcomes on all subscales of a trait questionnaire of decision-making in comparison to the low dysphoric group.

## **Method**

### **Participants and Design**

Fifty first-year psychology students (29 females, mean age = 18.9;  $SD = 1.69$ ) from The University of New South Wales (UNSW Sydney) participated in return for

course credit.<sup>2</sup> Participants were classified as either high or low dysphoric on the basis of applying a cut-off criterion to their scores on the depression subscale of the Depression Anxiety Stress Scale (DASS-21; Lovibond & Lovibond, 1995). Participants who scored in the moderate depression range or above (i.e.,  $\geq 14$ ;  $n = 24$ ) were classified as high dysphoric, while participants who scored in the normal or mild range (i.e.,  $< 14$ ;  $n = 26$ ) were classified as low dysphoric. Previous analogue studies have used a cut-off of  $\geq 14$  on the DASS-21 depression subscale to define a high dysphoric group (e.g., Moulds, Williams, Grisham, & Nickerson, 2012). The cell sizes of Study 1 were guided by the samples sizes of previous studies that yielded differential effects of abstract versus concrete thinking (e.g., Schiena et al., 2013, Study 2; Watkins & Baracaia, 2002). The study adopted a correlational design, and high and low dysphoric participants were compared on both abstractness of thought and a number of decision-making indices.

## Measures

**Study sign-up email.** Within 24 hours of signing up to take part in the study, participants received an email requesting that they come to their scheduled lab session having identified two real-life decision-making scenarios that they were currently facing in their personal life. They were informed that they would be asked questions about these two scenarios during the study, and should therefore identify the scenarios before coming into the lab. To ensure that the personal decision-making scenarios were somewhat standardised across participants, the email indicated that the scenarios should be personally important, and that participants should already have given them some

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<sup>2</sup> The study received ethical approval from the UNSW Human Research Ethics Advisory Panel- Panel C (HREAP – Behavioural Sciences; approval number 2514).

thought. In addition, participants were informed that they should select scenarios for which they have to make a decision within the next 6 months, and for which they were primarily responsible for making the decision (i.e., scenarios that do not require a group decision). Participants were sent another email the day before their scheduled lab session reminding them of these instructions.

**Depression Anxiety Stress Scale-21 (DASS-21; Lovibond & Lovibond, 1995).** The DASS-21 is a 21-item self-report questionnaire that consists of three subscales that assess the presence and level of depression, anxiety, and stress symptoms. Participants rate the extent to which each item (e.g., *“I felt that I had nothing to look forward to”*) applied to them over the past week. Ratings are indexed on a 4-point scale, where 0 = *did not apply to me at all* and 3 = *applied to me very much or most of the time*. The DASS-21 has very good psychometric properties (e.g., Ashiq, Majeed, & Malik, 2016; Sinclair et al., 2012). In this study, Cronbach’s alpha was .89, .84, and .88 for the depression, anxiety, and stress subscales, respectively.

**Ruminative Response Scale (RRS) of the Response Styles Questionnaire (Nolen- Hoeksema & Morrow, 1991).** The RRS is a 22-item self-report questionnaire that indexes the tendency to ruminate in response to sad mood. Participants rate the frequency with which they engage in a ruminative response described in each item (e.g., *think “Why can’t I get going?”*) when feeling sad, down, or depressed. Ratings are indexed on a 4-point scale, where 1 = *almost never* and 4 = *almost always*. The RRS possesses strong psychometric properties (e.g., Spasojevic & Alloy, 2001; Yook, Kim, Suh, & Lee, 2010). In this study, Cronbach’s alpha was .95.

**Decision Behaviour Questionnaire (DBQ; Radford, Mann, Ohta, & Nakane, 1993).** The DBQ is a self-report questionnaire that indexes participants’ general sense of

self-esteem as a decision-maker (6 items), the stress they usually experience during decision-making (10 items), and their typical decision response styles (4 subscales, 6 items per subscale). In the current study, the decisional self-esteem scale, decisional stress scale, and only 2 of the 4 decision-response style subscales (decisional avoidance and decisional hyper-vigilance) were administered. The decisional choice subscale and the decisional complacency subscale were not administered due to time constraints and given that of the four subscales, these two possess the lowest internal consistency (Radford et al., 1993). The DBQ has good psychometric properties (e.g., Radford et al., 1993). In this study,  $\alpha = .68, .65, .93$ , and  $.70$ , for the self-esteem, stress, avoidance, and hyper-vigilance subscales, respectively.

**Decision-making tasks.** Participants completed four decision-making tasks. Of the four decision tasks, two pertained to decision-making dilemmas that they were currently facing in their personal life (i.e., self-identified), and two pertained to hypothetical decision-making scenarios (i.e., provided by the experimenter). The first hypothetical scenario described a situation in which they were asked to imagine that they had started a new high-pressure job 3 months ago, and were recently given an unfair and demanding job task. The participant's task was to decide whether they would complete the task or quit the job. The second scenario described a situation in which participants were asked to imagine that they had been having a tough week and, in order to feel better, had paid a deposit to join a sports club in which they could play their favourite sport on the weekends. The scenario goes on to describe that on the first day the club members do not appear to be very welcoming, and as a result, for most of the game, they had no choice but to watch the others play. The participant's task was to decide whether to continue to participate in the upcoming weeks or to quit the club.



These two scenarios were created due to the fact that they were scenarios that university students could plausibly face. Pilot testing also revealed that the scenarios were ones that could be processed in a concrete way (i.e., by adopting a course of action to address the situation) or abstract way (i.e., by focusing on the meaning, implications, and consequences of the situation). See Appendix D for the exact wording of the two hypothetical scenarios.

For all four of the decision tasks, participants were given the following instructions: *“Write out the thoughts that come to mind when trying to arrive at decision for this scenario. You should arrive at, and state your decision by the end of your written response, even if you are not completely confident in your decision”*.

Participants were instructed to spend 7-10 minutes on each decision task and were encouraged to write as much as possible. They were also advised that they did not need to be concerned with their grammar, spelling, or sentence structure.

**Pre-decision measures.** Immediately before commencing each of the two personally-relevant decision scenarios, participants rated: i) the extent to which they had already thought about the decision scenario (from 1 = *I’ve thought about it once or twice* to 7 = *I think about it constantly*). They also rated (from 1 = *not at all* to 7 = *highly/very*): ii) the extent to which the decision scenario was personally important to them, iii) how difficult they expected it would be to make a decision, iv) the extent to which they felt capable of making a decision, and v) the extent to which they felt unhappy when they thought about having to make a decision. No pre-decision measures were obtained for the hypothetical decision scenarios.

**Post-decision measures.** Immediately following the completion of each of the four decision-making tasks, participants rated items that indexed their experience of the

decision-making process. Specifically, they rated: i) the extent to which they felt capable of carrying out their stated decision, ii) the level of stress and iii) indecision they experienced during the decision-making process, iv) the level of confidence they felt in their decision, v) the extent to which they were likely to regret their decision, vi) the level of uncertainty and vii) satisfaction they currently felt with their decision, and viii) the extent to which they believed their decision was in their best interest. Ratings were provided on a 5-point scale, where 1 = *not at all*, and 5 = *very much*.

**Levels of abstract versus concrete thinking.** Written responses to each of the four decision-making tasks were coded for levels of abstract versus concrete thinking according to Stober et al.'s (2000) coding scheme. The coding scheme defines abstract thought as "*indistinct, cross-situational, equivocal, unclear, aggregated*" and concrete thought as "*distinct, situationally specific, unequivocal, clear, singular*". To elaborate on these definitions, characteristics of abstract versus concrete thought drawn from the findings of researchers who have tested the differences between these two styles of thought (e.g., Watkins & Baracaia, 2002) were also included in the coding manual. Ratings for each written response were provided on a 5-point scale, where 1 = *abstract*, 2 = *somewhat abstract*, 3 = *neither abstract nor concrete*, 4 = *somewhat concrete*, and 5 = *concrete*. See Appendix E for the full set of coding instructions.

## **Procedure**

On the day of signing-up to the study, participants received an email requesting that they come to their scheduled lab session having identified two real-life decision-making scenarios that they were currently facing in their personal life. Participants were resent this email the day before their lab session. Upon arriving at the lab, participants were seated at a computer and asked to provide informed consent. Participants were

then instructed to complete the DASS-21, RRS, and the Decision Behaviour Questionnaire. Next, participants were reminded of the instructions that they received in the two emails that the experimenter sent before they came into the lab, and were informed that the next task would pertain to the two personal decision scenarios they had thought of. Participants first completed the pre-decision measures for the first personal decision scenario, completed the decision-making writing task for the scenario, and then provided ratings on the post-decision measures. This procedure was then repeated for the second personal decision scenario and then for the two hypothetical decision scenarios. Finally, participants were debriefed and thanked for their participation.<sup>3</sup>

## **Results**

For all statistical analyses, an alpha level of .05 was used. Effect sizes for independent *t*-tests are reported, whereby values up to .2 refer to small, .5 to moderate, and .8 to large effect sizes (Cohen, 1988).

### **Sample Characteristics**

Means and standard deviations of sample characteristics are presented in Table 2.1. The high dysphoric group had an average DASS-21 depression score of 22 and thus fell within the ‘severe’ range, according to DASS-21 depression cut-offs (Lovibond & Lovibond, 1995). For the low dysphoric group, the average DASS-21 depression score was 4.15 (within the ‘normal’ range). Independent samples *t*-tests revealed that,

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<sup>3</sup> During debriefing for this study and all subsequent studies, participants received a referral sheet that listed the contact details of relevant psychological services. Any participants who scored highly on the DASS-21 depression items also received an additional debriefing that included the experimenter offering to arrange for them to talk to a clinical psychologist. In the event that a participant was highly distressed or the experimenter had significant concerns about the participant’s wellbeing, the supervising clinical psychologist was contacted.

unsurprisingly, the groups differed significantly on the DASS-21 depression subscale,  $t(41.47)^4 = 14.28, p < .001, d = 4.07$ , and the RRS,  $t(48) = 6.03, p < .001, d = 1.70$ , such that the high dysphoric group reported greater depressive symptoms, and a greater tendency to ruminate in response to sad mood.

Further independent samples *t*-tests revealed that the two groups did not differ in age,  $t(48) = 0.60, p = .55$ , or on the DASS-21 anxiety,  $t(48) = 0.16, p = .87$ , or DASS-21 stress subscales,  $t(48) = 0.13, p = .90$ . A Pearson's chi-square analysis revealed that the high (58% female) and low dysphoric groups (58% female) were also comparable on gender ( $\chi^2(1, N = 50) = 0.002, p = .96$ ). These findings confirm that any between-group differences on the decision-making indices are more likely to be attributable to differences in symptoms of depression and ruminative tendencies, rather than age, stress, or anxiety symptoms.

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<sup>4</sup> Test statistic reported on adjusted df due to unequal variances (based on Levene's test).

Table 2.1

*Means and Standard Deviations for Age, Trait Measures, and Decision Behaviour Questionnaire Subscales*

	Group			
	High dysphoric ( $n = 24$ )		Low dysphoric ( $n = 26$ )	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Age	18.75	1.54	19.04	1.84
DASS-21 depression	22.00	5.04	4.15	3.62
DASS-21 anxiety	8.75	8.88	9.15	8.49
DASS-21 stress	14.25	10.78	14.62	9.10
RRS	52.46	11.44	34.81	9.22
Decisional self-esteem	13.33	1.88	15.88	1.21
Decisional stress	14.75	2.51	9.42	3.28
Decisional avoidance	15.50	3.51	9.50	3.26
Decisional hyper vigilance	10.96	2.26	7.42	2.76

*Note.* For each scale, a higher score indicates a higher level of the indexed variable.

### **Decision Behaviour Questionnaire**

To examine whether participants in the high and low dysphoric groups differed on the Decision Behaviour Questionnaire subscales, a second series of independent sample *t*-tests was conducted, with decisional self-esteem, decisional stress, decisional avoidance, and decisional hyper-vigilance scores as the dependent variables. As

expected, the high dysphoric group reported worse decisional self-esteem,  $t(38.75)^5 = 5.65, p < .001, d = 1.61$ , more decisional stress  $t(46.45)^5 = 6.49, p < .001, d = 1.83$ , more decisional avoidance,  $t(48) = 6.26, p < .001, d = 1.77$ , and more decisional hypervigilance,  $t(48) = 4.94, p < .001, d = 1.40$ . Given the low Cronbach's alphas for the self-esteem and stress subscales ( $\alpha = .68$  and  $.65$ , respectively), the findings with these subscales should be interpreted with caution. See Table 2.1 for means and standard deviations.

### **Pre-decision Measures**

The high and low dysphoric groups were compared on their pre-decision ratings for the personal decision scenarios. Ratings were averaged across the two personal decisions, and then entered as dependent variables in a series of independent samples  $t$ -tests. There was no between-group difference in ratings of the personal importance of the decision scenario,  $t(48) = .72, p = .48$ . However, high dysphoric participants reported that they spent more time thinking about the decision scenario,  $t(48) = 2.89, p = .006, d = -.81$ , expected more difficulty in making a decision,  $t(48) = 3.31, p = .002, d = 0.93$ , felt less capable of being able to make a decision,  $t(36.98)^5 = 6.69, p < .001, d = 1.92$ , and felt more unhappy at the thought of having to make a decision,  $t(42.80)^5 = 7.20, p < .001, d = 2.05$ . See Table 2.2 for the means and standard deviations.

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<sup>5</sup> Test statistic reported on adjusted df due to unequal variances (based on Levene's test).

Table 2.2

*Means and Standard Deviations for Pre-decision Ratings Averaged Across Personal Decision Scenarios*

	Group			
	High dysphoric ( <i>n</i> = 24)		Low dysphoric ( <i>n</i> = 26)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Time	5.58	0.75	4.94	0.82
Importance	6.04	0.75	5.88	0.79
Expectation	5.31	1.49	4.08	1.14
Capability	3.50	1.29	5.54	0.77
Unhappy	5.02	1.32	2.62	1.00

*Note.* Time = time spent thinking about the decision; Importance = personal importance of decision; Expectation = expectation of decision-making difficulty; Capability = decision-making capability; Unhappy = unhappiness at the thought of having to make a decision.

Ratings can range from 1 to 7, with higher ratings indicating greater levels of the indexed variable.

### **Post-decision Measures**

High and low dysphoric participants were then compared on scores on the post-decision measures for all four decision scenarios (means and standard deviations of the measures are presented in Table 2.3 for the personal scenarios and Table 2.4 for the hypothetical scenarios). Theoretically similar and highly correlated measures (i.e., with a bivariate correlation of .7 or above) were averaged to produce two key composite measures. A composite negative affect score was created, averaging scores on the items that indexed stress, indecision, and uncertainty during the decision-making process. A positive affect score was also created by averaging scores on the items that indexed

capability, confidence, and satisfaction. See Appendix F for tables presenting bivariate correlations between all post-decision measures for the personal decision scenarios, and then for the hypothetical decision scenarios.

The high and low dysphoric groups were first compared on the personal decision scenarios. A series of independent samples *t*-test was conducted with decision-making time, negative affect, positive affect, regret expectation, and best-interest ratings as the dependent variables. High and low dysphoric participants did not differ in the amount of time taken to complete the task,  $t(48) = 0.25, p = .80$ . However, as expected, high dysphoric participants reported more negative affect,  $t(41.14)^6 = 5.50, p < .001, d = 1.56$ , and less positive affect during the decision-making process,  $t(48) = 6.70, p < .001, d = 1.87$ , as well as a greater expectation that they would regret their decision,  $t(48) = 4.61, p < .001, d = 1.29$ . The high dysphoric group also reported lower ratings in their belief that the decision that they made was in their best interest,  $t(48) = 5.59, p < .001, d = 1.57$ .

The high and low dysphoric groups were then compared on the hypothetical decision scenarios. Independent samples *t*-tests revealed a pattern of results that were largely similar to those observed for the personal decision scenarios. High and low dysphoric participants spent a comparable amount of time completing the decision tasks,  $t(48) = 0.14, p = .89$ . Participants in the high dysphoric group reported more negative affect,  $t(48) = 5.26, p < .001, d = .70$ , less positive affect,  $t(48) = 2.47, p = .02, d = 1.48$ , and a greater expectation that they would regret their decision,  $t(48) = 5.88, p < .001, d = 1.66$ . However, there was no significant difference between the groups in

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<sup>6</sup> Test statistic reported on adjusted df due to unequal variances (based on Levene's test).



ratings of belief that the decision that they made was in their best interest,  $t(48) = 0.93$ ,  $p = .36$ .

Table 2.3

*Means and Standard Deviations for Decision-Making Time and Post-Decision Ratings Averaged Across Personal Decision Scenarios*

	Group			
	High dysphoric ( $n = 24$ )		Low dysphoric ( $n = 26$ )	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Time (seconds)	407.21	128.40	397.51	145.34
Capable	3.04	0.97	4.37	0.59
Stress	3.81	1.12	2.54	0.96
Indecision	4.21	0.94	2.87	0.86
Confidence	2.73	0.85	4.06	0.74
Regret	3.04	0.97	1.94	0.71
Uncertainty	3.83	1.17	2.33	0.95
Satisfaction	2.77	0.91	4.00	0.72
Best interest	3.25	0.86	4.40	0.58
Negative affect	3.95	1.01	2.58	0.72
Positive affect	2.85	0.77	4.14	0.60

*Note.* Negative affect score is the average of scores on stress, indecision, and uncertainty. Positive affect score is the average of scores on capability, confidence, and satisfaction. Scores for the ratings items can range from 1 to 5, with higher ratings indicating greater levels of the indexed variable.

Table 2.4

*Means and Standard Deviations for Decision-Making Time and Post-Decision Ratings Averaged Across Hypothetical Decision Scenarios*

	Group			
	High dysphoric ( $n = 24$ )		Low dysphoric ( $n = 26$ )	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Time (seconds)	288.55	87.88	284.58	117.03
Capable	3.35	0.96	4.08	1.35
Stress	3.50	0.97	2.06	1.13
Indecision	3.46	1.22	2.00	0.88
Confidence	3.17	0.96	4.04	1.36
Regret	3.42	1.02	1.79	0.94
Uncertainty	3.17	1.07	1.90	0.94
Satisfaction	3.04	0.95	3.79	1.31
Best interest	4.38	0.59	4.10	1.35
Negative affect	3.38	1.01	1.99	0.85
Positive affect	3.19	0.86	3.97	1.31

### **Levels of Naturally-Occurring Abstract versus Concrete Thinking**

Two coders who had been trained in the coding scheme developed by Stober et al. (2000) each coded all 200 written responses. Interrater reliability between the raters who were blind to dysphoric status was high, with an intraclass correlation of .87 for the personal decision reflections and .90 for the hypothetical decision reflections. The ratings provided by the two raters were averaged to compute a mean score of abstract

versus concrete thinking for each of the four decision scenarios. Lower numbers on the scale indicate more abstract thinking. The mean rating of abstract thinking across the four scenarios was 2.23 ( $SD = 0.49$ ) for the high dysphoric group and 3.50 ( $SD = 0.75$ ) for the low dysphoric group. This between-group difference was significant,  $t(48) = 7.08$ ,  $p < .001$ ,  $d = 2.00$ , indicating that high dysphoric participants engaged in more abstract thinking than low dysphoric participants.

### Discussion

The primary goals of Study 1 were to test the predictions that, relative to low dysphoric individuals, high dysphoric individuals report more decision-making problems and more abstract thinking during decision-making. The findings yielded support for both predictions. On the decision-making subscales, personally-relevant and hypothetical decision tasks, high dysphoric participants provided less favorable ratings of their decision-making experience than did low dysphoric participants. High dysphoric individuals were also more likely than low dysphoric individuals to naturally adopt a more abstract than concrete style of thinking during decision-making.

Study 1 dichotomised participant groups on depression scores in order to test the hypotheses that abstract thinking and decision-making-problems are characteristic of high dysphoric individuals as compared to low dysphoric individuals. That said, it is worth pointing out that the process of dichotomising depression scores subsumes variability within participant groups, resulting in a loss of potentially meaningful data and a loss of statistical power. Future replications and extensions of this study could consider entering depression scores as a continuous variable.

This finding that high dysphoric individuals naturally engaged in more abstract than concrete thinking during decision-making, in conjunction with the finding that they

reported more decision-making problems, lends support to the proposal that abstract thinking may be contributing to at least some of the decision-making problems observed in depression. Due to the correlational nature of Study 1, however, it cannot be concluded that engaging in abstract thinking produces decision-making deficits. The alternative possibility is that decision-making deficits lead to an increased tendency to engage in abstract thinking during decision-making, potentially as an attempt to better understand the decision scenario. For example, perhaps experiencing difficulties with decision-making lends one to think in a more abstract high-level manner (e.g., to think “*why am I finding it so difficult to make this decision?*”). Given already-reviewed evidence of the adverse downstream consequences of adopting abstract thinking (e.g., increasing negative future thinking, worsening social problem solving) in depression, it is predicted that the former possibility is more likely; that is, that abstract thinking leads to decision-making deficits. To test this prediction, a second study was conducted to experimentally compare the relative effects of abstract and concrete thinking on decision-making. A task with ‘real world’ consequences was employed to maximize ecological validity. In addition, the author focused on a specific aspect of decision-making, namely decision latency.

### **Study 2 – The Effect of Abstract versus Concrete Thinking on Procrastination in Depression**

The aim of Study 2 was to test whether inducing an abstract style of thinking would have a more negative impact on decision latency; i.e., the length of time it takes to make a decision. Whilst taking longer to make some decisions (e.g., whom to marry or where to purchase a home) may not be indicative of poor decision-making, there are a number of scenarios in which longer decision-making times are likely to be

problematic; for example, tasks with deadlines or incentives for early completion.

Features of depression such as rumination, passivity, and indecisiveness (Ward et al., 2003; Watkins 2016) may make depressed individuals particularly susceptible to taking longer to arrive at a decision in these scenarios.

As described in the Introduction, the relative effects of abstract versus concrete thinking on decision latency have been examined in a set of three studies outside the field of depression research (McCrea et al., 2008). In each of the three studies, McCrea et al. (2008) asked participants to complete a questionnaire following an abstract or concrete thinking induction. All participants were asked to complete the questionnaire within three weeks in order to receive compensation for participating in the study. In all three studies, there were no between-condition differences in participants' ratings of the extent to which they predicted that the questionnaire would be difficult, pleasant, convenient, and important to complete. Nonetheless, in all three studies participants in the abstract condition took longer to return their completed questionnaire than did participants in the concrete condition, suggesting that abstract thinking may interfere with completing a course of action.

Whilst the findings of McCrea et al. (2008) provide support for the notion that abstract thinking has more of a negative impact on decision latency than concrete thinking, their studies were conducted with unselected samples of participants whose depression symptoms were not indexed. Therefore, in order to increase the clinical utility of these findings, Study 2 aimed to replicate these findings in a sample of participants who reported high levels of depressive symptoms. Specifically, it was predicted that in a sample of high dysphoric participants, those who were instructed to

engage in abstract thinking would take longer to complete a task than those who were instructed to engage in concrete thinking.

Study 2 therefore sought to continue the clinically relevant line of work by Schiena and colleagues (2013). As noted above, to the author's knowledge the study by Schiena et al. (2013) is the only one in the published literature to have tested the prediction that abstract (relative to concrete) thinking impairs decision-making in the context of depression. They found that high dysphoric participants took longer to arrive at a decision for a set of decision scenarios when engaging in abstract thinking than when engaging in concrete thinking. Whilst an important preliminary study, a noteworthy limitation of their design was that the decision scenarios employed were hypothetical. Accordingly, it seems reasonable to question the ecological validity of the findings, as presumably participants were unlikely to have believed that the decision scenarios had any real-life consequences. Hence, the aim of this study was to continue Schiena et al.'s (2013) line of research whilst adopting the more ecologically valid design of McCrea et al. (2008).

One issue regarding McCrea et al.'s (2008) studies that is relevant to consider is that the authors regarded participants who took longer to complete the questionnaires as having 'procrastinated more' in completing the task. However, all participants were informed at the outset that so long as they returned the questionnaire within the three-week timeframe they would be compensated for participating in the study. As such, there was no reason for participants to believe that returning the questionnaire earlier would in fact be a 'better' decision. Furthermore, it is possible that those participants who returned the questionnaire towards the end of the three-week timeframe may have done so simply because their schedule was less busy that week – rather than due to the

fact that they had procrastinated. In fact, in such an instance, returning the questionnaire during a less busy week would reflect good, rather than poor, decision-making skills.

In order to address this limitation, for Study 2 the author employed a reward scheme such that earlier completion of the writing task could unequivocally represent better decision-making. That is, for a decision task with a time limit *and* an incentive for early completion, it was considered reasonable to conceptualise longer task completion times as indicative of poorer decision-making. To create an incentivised reward scheme, participants were informed that the experimenter needed to present the findings of the study at an upcoming conference, and thus needed the data (i.e., the study to be completed) as quickly as possible. Participants were notified that they had nine days to complete the study, and owing to this time pressure, that in addition to their research credit they would receive \$5 if they completed the study within the first three days of receiving access to the study, \$2.50 if they completed the study between days 4-6 days, or no money if they completed the study in the last three days. A 9-day timeframe was used instead of the three-week one employed by McCrea et al. (2008) in order to increase the urgency with which participants would respond to the reward scheme.

The other key difference between the present study and McCrea et al.'s (2008) was that in the present study participants were asked at the outset to indicate the date and time by which they intended to complete the writing task. The rationale for this was to create a more accurate index of procrastination by operationalising the construct to be the difference in the time between when participants stated that they would complete the task (e.g., 6:00pm on the 24<sup>th</sup>) and when they actually completed the task (e.g., 11:12pm on the 24<sup>th</sup>). This measure was used alongside the author's other key index of decision latency: the length of time it took participants to complete the writing task. As the

present study was delivered through the online survey platform Qualtrics, the author was able to record the exact time that participants opened and submitted different parts of the study, and as a result able to precisely calculate these time measures. It was predicted that participants in the abstract condition would take longer to complete the task and would demonstrate more procrastination (i.e., there would be a longer delay between the time they indicated that they would complete the task and the time that they actually did), relative to participants in the concrete condition.

## **Method**

### **Participants and Design**

Ninety nine first-year psychology students from The University of New South Wales (UNSW Sydney) completed the online study in return for course credit.<sup>7</sup> At the outset of testing it was intended that the final sample would consist of 50 high dysphoric participants, similar to the sample size tested in Study 1. However, in the initial weeks of experimental testing most of the participants did not meet the criterion used to identify high dysphoric participants in Study 1. The author decided to continue testing up to 99 participants with the goal that the final sample would include at least 25 high dysphoric participants in each condition. After testing 99 participants, the data of 9 of participants was excluded from the analyses due to problems in recording their data in Qualtrics. The data of a further 3 participants was excluded due to the fact that they completed the writing task before they completed the pre-task ratings. The final sample consisted of 87 participants (66 females, mean age = 19.71;  $SD = 4.21$ ) who were randomly assigned to either the abstract ( $n = 43$ ) or concrete ( $n = 44$ ) condition. When

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<sup>7</sup> The study received ethical approval from the UNSW Human Research Ethics Advisory Panel- Panel C (HREAP – Behavioural Sciences; approval number 2281).



the criterion used to identify high dysphoric participants in Study 1 was applied for this study, only 20 (10 in the abstract condition, 10 in the concrete condition) of the 87 participants remained. Due to the insufficient number of high dysphoric participants in each condition, DASS-21 depression scores of all 87 participants were entered in the data analysis as a continuous measure. In keeping with the hypotheses of the study, the aim was to assess whether depression scores would more strongly predict task completion times and procrastination times in the abstract condition as compared to the concrete condition.

## **Measures**

**Study sign-up email.** Participants received an email on the day that they signed up to take part in the study which outlined preliminary study instructions. In the email participants were informed that they had nine days to complete the study, and that the earlier they completed the study, the better. As a cover story, the email stated that the experimenter needed data to present at an upcoming conference, and that participants would be rewarded \$5 if they completed the study within the first 3 days, \$2.50 if they completed it within 4-6 days, and no monetary compensation if they completed it within the last 3 days. The email provided two links that participants would need to click in order to access the study. The email explained that the second link would direct participants to the main task of the study, but that they should only click the second link after following the instructions and answering the pre-task questions enclosed in the first link. Finally, participants were informed that the experimenter would email them after they completed the study to arrange a 10-minute debriefing session at the lab, during which (if eligible), they would also be paid for completing the study early.

**Pre-task measures.** Participants were presented with the question they needed to answer for their assigned writing task, and then with a series of items that indexed their expectations of the task (replicating McCrea et al., 2008). First, they were instructed to rate on a 7-point scale (where 1 = *not at all*, and 7 = *very*) the extent to which they expected the writing task to be: (i) easy, (ii) difficult, (iii) pleasant, (iv) convenient, and (v) interesting to complete. Participants were then asked to estimate the length of time (in minutes) that they expected it would take them to complete the writing task, and to provide the date and time (e.g., 14/05/2014, 3:00pm) within the 9-day deadline that they intended to complete the task. These pre-task measures were administered to assess whether participants in the abstract and concrete conditions differed in their initial expectations of the writing task.

**Abstract versus concrete thinking task.** Participants were randomly assigned a writing task that was designed to induce either abstract or concrete thinking. Participants in the abstract condition were instructed to describe five reasons why it was important for them to do well in university. They were instructed to write 5-6 sentences on each reason, explaining what the reason was, why it was personally important to them, and its implications and consequences. Conversely, participants in the concrete condition were instructed to describe five steps that they would take in order to do well at university, and for each step, to write 5-6 sentences on the specific actions that they would take to complete that step. These instructions were based on those used in previous studies that employed abstract versus concrete thinking inductions (e.g., McCrea et al., 2008; Schiena et al., 2013, Watkins & Baracaia, 2002).

**Post-task measures.** Participants were presented with the first 5 rating items questions that they completed in the pre-task measures to index their *actual* experience

of task completion. That is, participants were instructed to rate on a 7-point scale (where 1 = *not at all*, and 7 = *very*) the extent to which they found the writing task to be: (i) easy, (ii) difficult, (iii) pleasant, (iv) convenient, and (v) interesting to complete.

Participants were also asked to indicate the number of attempts they made to complete the task, with a new attempt described as a re-commencing the task after taking a break of minimum 15 minutes.

**Time measures.** Two time measures were indexed by using the timestamps captured by Qualtrics. The first was the time taken for participants to complete the task, calculated as the difference between the time that they opened the task and the time that they submitted their response. The second was the measure of procrastination, calculated as the time difference between participants' intended completion time (e.g., 6:00pm on the 24<sup>th</sup>) and the time that they actually completed the task (e.g., 11:12pm on the 24<sup>th</sup>).

**Previously used measures.** The DASS-21 and RRS (as described in Study 1) were administered to rule out the possibility that any difference between conditions on pre-task, post-task, or time measures were due to a pre-existing difference between conditions on symptoms of depression, anxiety, and stress, or in their tendency to ruminate in response to sad mood. Cronbach's alpha was .90, .84, and .91 for the DASS-21 depression, anxiety, and stress subscales, respectively, and .96 for RRS.

**Manipulation check.** To supplement the coding of abstractness versus concreteness in participants' written descriptions, the author also administered the Behavioural Identification Form (BIF; Vallacher, & Wegner, 1989) following the completing of the post-task measures. The BIF lists 25 behaviours (e.g., "*making a list*") accompanied by 2 descriptors of the behaviour: an abstract descriptor (e.g.,

*“getting organized”*) and a concrete descriptor (e.g., *“writing things down”*).

Participants were asked to identify which option best describes the behaviour. The proportion of abstract (relative to concrete) preferences chosen by each participant was taken to reflect their degree of abstract thinking.

### **Procedure**

On the day of signing up to take part in the study, participants received an email with two links that they needed to access to complete the study, as well as information about the importance of and incentives for completing the study as early as possible. Upon opening the first link enclosed in the email, participants were given instructions as to how to provide informed consent. They were then presented with the abstract or concrete question that they needed to answer for the written task, and then administered the pre-task measures. Participants were informed to open the second link when they were ready to begin their writing task. They were also informed that once they began the writing task, they would not be able to save their response and return to it at a later time, and hence should try to complete the writing task in one sitting. When ready, participants clicked on the second link, completed the writing task, the post-task measures, and then the BIF. Finally, participants completed the DASS-21 and RRS. These trait measures were administered as part of the second link (as opposed to the first link) in order to index their depressive and ruminative symptoms as close to the time of the task completion as possible. After the completion of the study, the experimenter emailed the participants to arrange a debriefing session in the lab during which eligible participants were also paid the relevant amount of compensation.

### **Results**

For all statistical analyses an alpha level of .05 was used.

### **Sample Characteristics**

The final sample had a mean DASS-21 depression subscale score of 8.87 ( $SD = 9.56$ ), indicating that on average participants had a ‘normal’ level of depressive symptoms (Lovibond & Lovibond, 1995). An independent samples  $t$ -test demonstrated that there was no difference between participants in the abstract and concrete conditions in DASS-21 depression subscale scores,  $t(85) = 0.28, p = .78$ .

### **Trait Measures**

Hierarchical multiple regressions were conducted to assess whether there was a difference between conditions in the extent to which depression scores predicted anxiety scores, stress scores, and RRS. DASS-21 depression scores and experimental condition were entered in the first step, with the interaction term between depression score and condition added to the second step to assess for whether there was an increase in variation explained by the addition of the interaction term. As anticipated, experimental condition did not moderate the effect of DASS-depression on DASS-anxiety, DASS-stress, or RRS. Table 2.5 reports the results of each separate regression analysis for each dependent variable.

Table 2.5

*Hierarchical Regression Analyses: Depression and Condition predicting Anxiety, Stress, and Rumination*

Variable	<i>B</i>	<i>SE B</i>	$\beta$	<i>R</i> <sup>2</sup> Change
<b>DASS-21 anxiety</b>				
Step 1 $F(2, 84) = 44.24^{**}$				<b>.51</b>
DASS-21 depression <sup>**</sup>	.55	.06	.72	
Condition	.44	1.11	.03	
Step 2 $F(1, 83) = 1.93$				<b>.01</b>
DASS-21 depression x condition	.17	.12	.20	
<b>DASS-21 stress</b>				
Step 1 $F(2, 84) = 70.68^{**}$				<b>.63</b>
DASS-21 depression <sup>**</sup>	.77	.07	.79	
Condition	-.96	1.23	-.05	
Step 2 $F(1, 83) = .02$				<b>.00</b>
DASS-21 depression x condition	-.02	.13	-.02	
<b>RRS</b>				
Step 1 $F(2, 84) = 32.88^{**}$				<b>.44</b>
DASS-21 depression <sup>**</sup>	1.07	.13	.66	
Condition	2.43	2.53	.08	
Step 2 $F(1, 83) = .29$				<b>.00</b>
DASS-21 depression x condition	.15	.27	.08	

\* $p < .05$ , \*\*  $p < .01$

### Pre-task Measures

Further hierarchical multiple regressions were conducted to determine whether there was an increase in variation in each of the pre-task measures due to the addition of an interaction term between depression score and condition. Again, condition did not moderate the effect of depression scores on participants' estimates of task difficulty, pleasantness, convenience, or interestingness, nor on the length of time that they estimated the task would take to complete. Hence, any interactive effect of condition and depressive symptoms on the main time measures is unlikely to be due to pre-existing differences between the two conditions in the extent to which depressive

symptoms influenced participants' perceptions of the task. Table 2.6 reports the results of each regression analysis for each dependent variable.

Table 2.6

*Hierarchical Regression Analyses: Depression and Condition predicting Pre-Task Measures*

Variable	<i>B</i>	SE <i>B</i>	$\beta$	R <sup>2</sup> Change
<b>Expected difficulty<sup>8</sup></b>				
Step 1 <i>F</i> (2, 84) = 5.06**				.11
DASS-21 depression**	.04	.02	.28	
Condition	.48	.28	.18	
Step 2 <i>F</i> (1, 83) = .54				.01
DASS-21 depression x condition	.02	.03	.12	
<b>Expected pleasantness</b>				
Step 1 <i>F</i> (2, 84) = 7.57**				.15
DASS-21 depression**	-.05	.01	-.32	
Condition*	.65	.28	.24	
Step 2 <i>F</i> (1, 83) = .01				.00
DASS-21 depression x condition	.003	.03	.02	
<b>Expected convenience</b>				
Step 1 <i>F</i> (2, 84) = .31				.01
DASS-21 depression	-.02	.02	-.09	
Condition	-.001	.38	.00	
Step 2 <i>F</i> (1, 83) = .003				.00
DASS-21 depression x condition	.002	.04	.01	
<b>Expected interestingness</b>				
Step 1 <i>F</i> (2, 84) = 1.54				.04
DASS-21 depression	-.01	.02	-.05	
Condition	.64	.38	.18	
Step 2 <i>F</i> (1, 83) = .56				.01
DASS-21 depression x condition	.03	.04	.15	
<b>Expected completion time</b>				
Step 1 <i>F</i> (2, 84) = .36				.01
DASS-21 depression	-.14	.20	-.08	
Condition	-1.82	3.81	-.05	
Step 2 <i>F</i> (1, 83) = .17				.002
DASS-21 depression x condition	.17	.41	.08	

\* $p < .05$ , \*\*  $p < .01$

<sup>8</sup> Ratings of task ease (reversed) and task difficulty were averaged to produce a composite task difficulty score. Ratings had a bivariate correlation of -.71 ( $p < .01$ ) on the items indexing expected ease and difficulty and of -.78 on the items indexing actual ease and difficulty.

## Manipulation Checks

In order to check that the manipulations were successful, an independent *t*-test compared ratings of levels of abstractness versus concreteness of the written responses. Two independent raters blind to condition coded the written responses, one of whom had also coded the written responses from Study 1. Interrater reliability was high, with an intraclass correlation of .93. As anticipated, the written responses of participants in the abstract condition were rated as significantly more abstract ( $M = 1.36$ ,  $SD = 0.25$ ) than those of participants in the concrete condition ( $M = 4.50$ ,  $SD = 0.42$ ),  $t(69.76) = 42.21$ ,  $p < .001$ ,  $d = 9.09$ . The BIF produced evidence consistent with the results of the coding. Specifically, participants in the abstract condition endorsed more abstract than concrete descriptors ( $M = 16.53$ ,  $SD = 4.42$ ) relative participants in the concrete condition ( $M = 14.20$ ,  $SD = 5.63$ ),  $t(85) = 2.14$ ,  $p = .04$ ,  $d = .46$ .

## Time Measures

A hierarchical multiple regression was conducted to assess whether there was a between-condition difference in the extent to which depression scores predicted the length of time participants took to complete the writing task (i.e., from when they started the task to when they finished it). It was expected that depression scores would more strongly predict longer task completion time in the abstract condition compared to the concrete condition. DASS-21 depression scores and condition were entered in the first step, with the interaction term between depression score and condition added to the second step. As expected, condition moderated the effect of depression scores on task completion time; the addition of the interaction term led to a statistically significant increase in total variance explained of 9.3%,  $F(1, 83) = 9.63$ ,  $p = .003$ . Simple slopes analysis revealed that there was a statistically significant positive linear relationship



between depression scores and writing completion time in the abstract condition, ( $b = 1.02$ ,  $SE = .25$ ),  $p < .001$ , but not in the concrete condition ( $b = -0.21$ ,  $SE = .31$ ),  $p = .50$ . See Figure 2.1 for a scatterplot depicting the relationship between depressive symptoms and task completion time within each experimental condition.

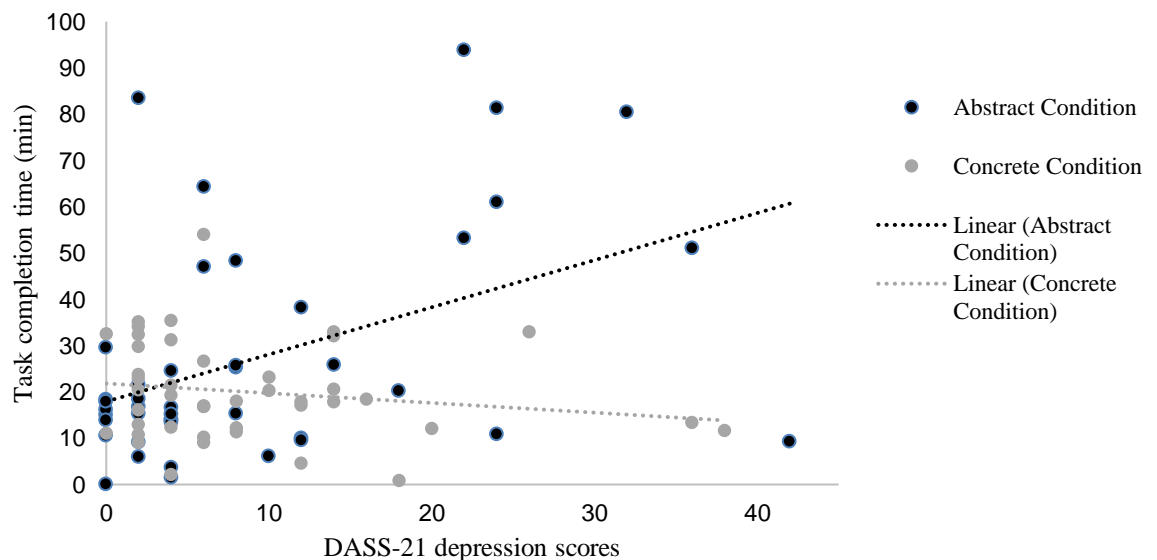


Figure 2.1. Relationship between depressive symptoms and task completion time within each condition.

Participants in the abstract condition took an average of 27.26 minutes ( $SD = 24.26$ ) to complete the writing task whereas participants in the concrete condition took an average of 20.03 minutes ( $SD = 10.60$ ).

The author intended to run a second hierarchical multiple regression to assess whether condition similarly moderated the effect of depression scores on the length of time that participants procrastinated in completing the writing task. However, only 16 out of 87 participants actually procrastinated in completing the task; that is, only 16 participants (8 in each condition) completed the task after their intended completion time. Accordingly, due to insufficient data the author was unable to run the regression as planned. 71 participants completed the task within the first 3 days and hence received

the maximum reward of \$5.00. 12 participants received \$2.50, and 4 participants received no monetary compensation.

### Post-task Measures

Hierarchical multiple regressions were conducted to assess for an increase in the variance of post-task measures explained by the addition of an interaction term between depression score and experimental condition. Interestingly, condition did not moderate the effect of depression scores on the extent to which participants rated the task to be difficult, pleasant, convenient, and interesting to complete. Table 2.7 reports the results of each separate regression analysis for each dependent variable.

Table 2.7

*Hierarchical Regression Analyses: Depression and Condition predicting Post-Task Measures*

Variable	<i>B</i>	SE <i>B</i>	$\beta$	R <sup>2</sup> Change
<b>Actual difficulty</b>				
Step 1 $F(2, 84) = 2.48$				<b>.06</b>
DASS-21 depression*	.04	.02	.21	
Condition	-.33	.35	-.10	
Step 2 $F(1, 83) = .156$				<b>.02</b>
DASS-21 depression x condition	-.05	.04	-.21	
<b>Actual pleasantness</b>				
Step 1 $F(2, 84) = 6.40^{**}$				<b>.13</b>
DASS-21 depression**	-.05	.02	-.31	
Condition	.62	.32	.20	
Step 2 $F(1, 83) = .01$				<b>.00</b>
DASS-21 depression x condition	.003	.03	.02	
<b>Actual convenience*</b>				
Step 1 $F(2, 84) = 3.65$				<b>.08</b>
DASS-21 depression*	-.05	.02	-.28	
Condition	-.18	.37	-.05	
Step 2 $F(1, 83) = .23$				<b>.003</b>
DASS-21 depression x condition	-.02	.04	-.10	
<b>Actual interestingness</b>				
Step 1 $F(2, 84) = 3.27^*$				<b>.07</b>
DASS-21 depression	-.04	.02	-.19	
Condition	.73	.39	.20	

Step 2 $F(1, 83) = .55$				<b>.01</b>
DASS-21 depression x condition	.03	.04	.15	

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\* $p < .05$ , \*\*  $p < .01$ .

### Discussion

The goal of Study 2 was to test the prediction that in the context of depressive symptoms, abstract (relative to concrete) thinking increases the length of time that participants take to complete a task that they were encouraged to complete as early as possible. As expected, depression scores predicted longer task completion times when participants engaged in abstract thinking, and not when they engaged in concrete thinking. Due to the small proportion of participants who actually procrastinated in completing the writing task, the author was unable to test whether condition similarly moderated the association between depression scores and procrastination time.

One potential account for the key finding of Study 2 is that higher levels of depressive symptoms may be more likely to lead to ongoing subsequent processing in the abstract condition (compared to the concrete condition) and, as a result, longer task completion times. That is, higher levels of depressive symptoms may have increased participants' likelihood of ruminating on the significance, implications, and potential consequences of their university performance, thereby increasing the length of time it took for them to complete the task. A large number of studies have shown that rumination is closely linked to depressive symptoms, is abstract and repetitive in nature, and difficult to disengage from (Davis & Nolen-Hoeksema, 2000; Nolen-Hoeksema et al., 2008; Watkins, 2008).

Another possible explanation as to why depressive symptoms were associated with longer task completion times in the abstract but not the concrete condition is that the thought content elicited by the abstract thinking induction is potentially more

emotionally and/or cognitively burdensome. The abstract thinking induction may have elicited thoughts such as ‘*Why do I have to do this?*’ “*Why can’t I ever do things as quickly as I would like?*” “*There is actually a lot that depends on how well I do at university*”. These types of thoughts may have produced in the more dysphoric participants a ‘paralysis by analysis’ effect, thereby increasing task completion time. This proposal accords with evidence that abstract thinking promotes negative self-evaluations (Rimes & Watkins, 2005) and negative future thinking in depression (Lavender & Watkins, 2004), and reduces one’s ability to ignore thoughts of irrelevant information during mental activities that require strategic thinking (Philippot & Brutoux, 2008; Watkins & Brown, 2002). That said, if burdensome thoughts were more likely to emerge for participants in the abstract condition than for participants in the concrete condition, it is interesting that condition did not moderate the effect of depression scores on any of the ratings of task experience such as task difficulty and task pleasantness.

Based on the findings of McCrea et al. (2008), it was hypothesised that in addition to longer task completion times, abstract thinking would also lead to longer procrastination times than concrete thinking. This hypothesis could not be tested however as only a very small number of participants actually procrastinated in the study. That is, only 16 out of 87 completed the task after their intended completion time. It is possible that the author’s use of incentives for early task completion reduced the likelihood of detecting the procrastination effects that were reported by McCrea et al. (2008), who did not offer their participants any incentivised reward scheme. Consistent with this possibility, the large majority of participants (71 out of 87) in the present study completed the task within the first 3 days, and thus received the maximum

reward of \$5.00. It is possible that had the author not offered a monetary incentive and simply informed participants that the experimenter needed the data as early as possible within the 9-day timeframe, a larger proportion of participants may have actually procrastinated. Another possibility is that instructing participants to write about how/why they want to do well in university was too simple a task, and thus unlikely to be one that participants would procrastinate in completing. Indeed, participants on average rated the task as moderate in difficulty, interestingness, pleasantness, and convenience (mean rating on these items was 3.66,  $SD = 1.7$ ; where 1 = not at all, 7 = very). It is also possible that had participants been given a more laborious or aversive task (e.g., a task in which they needed to conduct research online), they would have been more likely to procrastinate, and differential effects of the inductions may have emerged.

It also important to point out that McCrea et al. (2008) operationalised procrastination as the time between participants having received the task, and the time that they completed it. On the other hand, the author of the present study operationalised procrastination as the time difference between when participants indicated that they intended to complete the task and when they actually completed it (i.e., the time delay). This measure is considered to be a more accurate index of procrastination as it is in line with the way in which procrastination is typically defined in the literature (Steel, 2007). It is interesting to note that the way in which McCrea et al. (2008) defined procrastination is equivalent to the way in which the author of the present study defined task completion time, for which there was an effect of condition that was line with the effect observed by McCrea et al. (2008). In this sense, the findings of the two studies

are consistent; however, the way in which the authors' conceptualized the time measures differs across the studies.

It is worth pointing out that due to the insufficient number of high dysphoric participants in Study 2, the author was unable to compare the effects of thinking style on high dysphoric participants versus low dysphoric participants. On the one hand, utilizing a continuous measure of depressive symptoms as a key predictor is more in line with the growing movement to conceptualize psychological disorders on a continuum. There was, however, a substantial proportion of participants in Study 2 with low depressive scores, and hence it is questionable as to whether the findings would generalise to individuals with high or clinical levels of depressive symptoms.

Overall, Studies 1 and 2 have taken one of the first steps to examine the role of abstract thinking versus concrete thinking in decision-making problems in depression. Study 1 demonstrated that high dysphoric individuals naturally engaged in more abstract than concrete thinking during decision-making and report more decision-making problems than low dysphoric individuals. Study 2 demonstrated that abstract thinking contributed to a particular decision-making problem that depressed individuals are likely to struggle with, namely, the length of time it takes for them to complete a task that is required to be completed as early as possible. The findings of Study 2 suggest that inducing a concrete style of thinking may be effective in remediating this decision-making problem.

Similar to the way in which Study 2 examined one aspect of decision-making, it is important for future studies to examine the effects of abstract versus concrete thinking on other steps of the decision-making process, particularly steps that are known to be challenging for depressed individuals. An example of one such step is the ability to take

the initiative to commit to a proactive choice option (e.g., signing up to the gym, attending a social event, or applying for a better job role) over a non-committal passive choice option (e.g., not signing up the gym, staying at home, remaining in the less ideal job role). Specifically, could concrete (relative to abstract) thinking lead to higher rates of behavioural proactivity in depressed individuals? Studies 3 and 4 were conducted to test this line of questioning.

### **CHAPTER 3: The Relative Effects of Abstract versus Concrete Thinking on Proactivity**

Anhedonia, fatigue, behavioural avoidance, passivity and withdrawal are all key features of depression (DSM-5; American Psychiatric Association, 2013; Clark & Watson, 1991; Ottenbreit & Dobson, 2004). It is therefore not surprising that another characteristic and decision-relevant problem of depressed patients that clinicians frequently note is low levels of proactivity (Watkins, 2016). That is, depressed individuals often report a low level of willingness to engage in self-initiated behaviour in response to a current or future situation. Common displays of poor proactivity in depression include a lack of effort to engage in social activities, exercise, and to seek or continue treatment (Schwartz & Petersen, 2016). A diminished ability to engage in proactive behaviour may reinforce a depressed individual's negative self-perception, for example, by making them feel even more incapable of positively shaping their future and by leading to or reinforcing their tendency to avoid initiative-taking altogether. This avoidance could in turn contribute to low motivation to engage in functional activities or to withdraw from maladaptive tendencies, both of which are imperative for recovery (Leahy, 2001). Clearly proactivity is important to address in the context of treatment, yet minimal research has tested potential factors that may contribute to low proactivity in depression. One possibility that has not yet been tested is that abstract thinking inhibits proactivity in depression.

To the author's knowledge, no study to date has investigated the relative effects of abstract versus concrete thinking on proactivity in depression. There is however some research outside of the clinical literature that has yielded findings in line with the prediction that thinking in a concrete way about a future scenario that requires proactive



behaviour leads to higher levels of proactivity relative to thinking about it in an abstract manner. Research from social psychology, for example, has demonstrated that increased specificity in goal-setting is associated with or leads to higher levels of goal commitment and performance outcomes (e.g., Armitage, 2004; Hall, Weinberg, & Jackson, 1987; Locke & Latham, 1990; Sheeran & Orbell, 1999, 2000). In some of these studies researchers have specifically tested and demonstrated the effects of forming implementation intentions in facilitating goal enactment (for a meta-analysis see Gollwitzer & Sheeran, 2006). Implementation intentions are action plans that specify how people plan to achieve their goals (Gollwitzer, 1999). The low-level details required for implementation intentions (e.g., identifying how, when, and where to enact one's goal) mirrors the type of thought that is required to engage in concrete thinking (Watkins & Baracaia, 2002).

To test the hypothesis that abstract thinking leads to lower levels of proactivity than concrete thinking in depression, two studies were conducted with high dysphoric individuals. Only high dysphoric participants were tested in Studies 3 and 4 due to the fact that Studies 1 and 2 demonstrated that decision-making is more of a problem in the context of high levels of depressive symptoms. In Studies 3 and 4 participants were provided with information about a task, instructed to engage in either abstract or concrete thinking about that task, and then presented with measures that indexed the proportion of participants in each condition who demonstrated proactivity (i.e., willingness to engage in the task).

### **Study 3 – The Relative Effects of Abstract versus Concrete Thinking on Proactivity towards a Prescribed Task**

In this study participants were asked to imagine that they had been invited to

participate in a 3-week study that would take place in the lab later in the year. All participants received the same information about the 3-week study and completed a writing task that led them to think abstractly or concretely about the idea of participating in the study. They were then informed that they did in fact have the opportunity to sign-up to take part in the 3-week study, and were asked to indicate whether or not they would do so. In order to obtain a better sense of how concrete thinking might increase proactivity relative to abstract thinking, a number of rating items were administered for participants to complete following their thinking induction. These items indexed their experience of the decision-making process (e.g., their levels of stress, indecision) and the extent to which they felt capable of being able to complete the 3-week study. It was predicted that participants in the concrete condition would demonstrate a higher rate of sign-ups, more positive outcomes on the items that indexed their decision-making experience, and higher ratings of capability.

## **Method**

### **Participants and Design**

Sixty nine first-year psychology students from The University of New South Wales (UNSW Sydney) completed the study in return for course credit.<sup>9</sup> Participants were eligible to take part in the study if their online pre-screening score on the DASS-21 depression subscale met the criterion used to identify high dysphoric participants in the preceding studies [i.e., they had a score of  $> 14$  and thus at minimum a moderate level of depressive symptoms according to DASS-21 cut-offs (Lovibond & Lovibond, 1995)]. Participants were instructed to complete the DASS-21 again in the lab on the

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<sup>9</sup> The study received ethical approval from the UNSW Human Research Ethics Advisory Panel- Panel C (HREAP – Behavioural Sciences; approval number 2371).

day of their scheduled study session, in order to ensure that their level of self-reported depression symptoms was still in the high dysphoric range. Of the 69 participants who completed the pre-screening, only 50 were still in the high dysphoric range on the day of their participation. The 19 participants who did not meet criteria were excluded from the data analysis. The final sample therefore consisted of 50 participants (34 females, mean age = 18.60,  $SD = 1.81$ ) who were randomly assigned to either the abstract ( $n = 25$ ) or concrete ( $n = 25$ ) condition. The sample sizes were based on previous studies that yielded a difference between abstract and concrete thinking (e.g., Schiena et al., 2013, Study 2; Watkins & Baracaia, 2002).

## Measures

**Previously used measures.** The DASS-21 and RRS were described in Chapter 2. In this study, Cronbach's alpha was .72, .81 and .80 for the DASS-21 depression, anxiety, and stress subscales, respectively, and .85 for the RRS.

**Information sheet about future 3-week study.** Participants were presented with an information sheet that outlined a 3-week experiment that they were informed would be conducted by researchers in the lab in the following semester. The experiment was described as a study of the way in which individuals approach and reflect upon decision scenarios. The information sheet outlined that during the 3-week study, participants would be required to record 6 important decision scenarios that they were facing in their personal life, the thoughts that they were having during the decision-making process for each scenario, and the final decision that they made for each scenario. Participants were also informed that they would need to come into the lab again at the end of the 3-week period in order to complete additional questionnaires and answer questions about the decision scenarios that they recorded in their diary. The

information sheet also outlined the expected length of time required to participate in the study (i.e., 3 hours), as well as the amount of money that participants would be reimbursed for their time (\$15/hour). See Appendix H for the full information sheet.

**Abstract versus concrete thinking manipulation.** Participants were instructed to spend ten minutes on a writing task that induced either abstract or concrete thinking about participating in the 3-week study. Participants in the abstract condition were asked to answer questions such as *“Why would you be willing to participate in the study?”* and *“What are some potential consequences of participating in this study?”* Participants in the concrete condition answered questions such as *“Write out the steps you would have to take to work this study into your schedule alongside your other commitments (e.g., social/work/personal life.)”* and *“List the specific steps you could take to make sure you complete all the study requirements (e.g., diary journaling requirements) that you will be asked to do before coming into the lab for the final session of the study”*. Participants were informed that when writing their answers they did not need to worry about their grammar, spelling, or sentence structure. See Appendix I for the complete list of questions that were administered in the abstract and concrete conditions.

**Sign-up sheet for future 3-week study.** Participants were provided with a decision sheet (see Appendix J) on which they were instructed to indicate whether or not they would sign up to take part in the 3-week study. Participants who provided consent to partake in the study also completed a section on the sheet that requested contact details (email address and mobile number).

**Self-report ratings.** Participants rated the level of i) indecision, and ii) stress that they experienced when making the decision as to whether they would sign-up; iii)

the level of confidence, iv) regret, and v) satisfaction that they felt with their decision to sign up/not sign up; vi) the extent to which they believed signing-up would be the right thing to do; and vii) the extent to which they felt capable of being able to complete the 3-week study. Ratings were provided on a 5-point scale, where 1 = *not at all*, and 5 = *very much*.

## **Procedure**

Participants were tested individually at the lab. Upon arrival, they provided informed consent to take part in the study, and then completed the DASS-21 and RRS. The experimenter then informed participants that there was another experimenter in the lab who would be running a 3-week long study next semester, and asked them to imagine that they were given the opportunity to participate in that study.<sup>10</sup> Participants were provided with the information sheet about the 3-week study, and then given 10 minutes to complete the writing booklet that induced either abstract or concrete thinking about participating in the study.

After completing the writing booklet, the experimenter informed the participants that they did in fact have the opportunity to sign up to take part in the study, and presented them with the sign-up sheet. In order to minimise demand effects, the experimenter told participants that after they indicated their decision about whether they would sign-up they should fold the sign-up sheet in half and seal it in the envelope on the table. The experimenter stated that the sealed envelope would be delivered to the other experimenter in the lab who would run the 3-week long study. The experimenter left the room to allow the participant to make the decision in private, but before doing

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<sup>10</sup> Participants were asked if they would still be at UNSW in the following semester; all participants indicated that that they would be.

so instructed participants to press the room buzzer once they had sealed the envelope with their decision. Upon leaving the room, the experimenter immediately began to surreptitiously time how long it took for the participant to press the room buzzer as an index of decision-making time. After the room buzzer was pressed, the experimenter stopped the timer and returned to the room to administer the self-report rating items. Finally, participants were debriefed and informed that an experimenter in the lab was indeed intending to conduct the 3-week study the following semester and that if they consented to take part they could be contacted near to the time of the study administration.

## Results

For all statistical analyses an alpha level of .05 was used. Effect sizes for independent samples *t*-tests are reported, whereby values up to .2 refer to small, .5 to moderate, and .8 to large effect sizes (Cohen, 1988).

### Sample Characteristics

Means and standard deviations of sample characteristics are presented in Table 3.1. Participants had a mean DASS-21 depression score of 20.48 ( $SD = 7.29$ ), suggesting that overall the final sample had a ‘moderate’ level of depressive symptoms according to DASS-21 cut-offs (Lovibond & Lovibond, 1995).

To ensure that there were no pre-existing between-condition differences, a series of independent samples *t*-tests was conducted. Age, DASS-21 depression, DASS-21 anxiety, DASS-21 stress and RRS were entered as dependent variables. There were no between-condition differences in age,  $t(48) = 1.41, p = .17$ , DASS-21 depression,  $t(48) = 1.73, p = .09$ , DASS-21 anxiety,  $t(48) = 1.28, p = .21$ , DASS-21 stress,  $t(48) = .67, p$

= .51, or RRS,  $t(38.87)^{11} = 1.64, p = .11$ . A Pearson's chi-square analysis revealed that the abstract (60% female) and concrete (76% female) conditions were comparable in gender, ( $\chi^2(1, N = 50) = 1.47, p = .23$ ).

Table 3.1

*Means and Standard Deviations for Participant Characteristics and Self-Report*

*Measures*

	Condition			
	Abstract thinking ( $n = 25$ )		Concrete thinking ( $n = 25$ )	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Age	18.80	2.43	18.40	0.82
DASS-21				
depression	21.92	7.67	19.04	6.74
DASS-21 anxiety	12.72	8.96	9.92	6.26
DASS-21 stress	19.52	9.75	17.84	7.81
RRS	57.16	11.80	52.68	6.95

**Abstract versus Concrete Thinking Manipulation Check**

Participants' written reflections for each writing task were coded for levels of abstract versus concrete thinking using the coding scheme utilised in Studies 1 and 2 (Stober et al., 2000). Interrater reliability between the two coders who were trained in the coding system and blind to condition was high, with an intraclass correlation of .94.

<sup>11</sup> Test statistic reported on adjusted df due to unequal variances (based on Levene's test).

The mean rating of abstract versus concrete thinking, across the two coders, was 1.51 ( $SD = 0.39$ ) for the abstract condition and 4.48 ( $SD = 0.32$ ) for the concrete condition. The between-condition difference was significant, demonstrating that the thinking manipulation was effective,  $t(48) = 29.45, p < .001, d = 8.33$ .

### **Decision-making Measures**

The next analysis tested the primary hypothesis that participants in the concrete condition would be more likely to sign up to the 3-week study relative to participants in the abstract condition. A Pearson's chi-square analysis indicated a significant association between experimental condition and whether participants signed-up, in the expected direction, ( $\chi^2(1, N = 50) = 8.12, p = .004$ ). The odds ratio was such that participants in the concrete condition were 5.63 times more likely to sign-up compared to those in the abstract condition. 19 of the 25 participants (i.e., 76%) in the concrete condition signed-up to the 3-week study compared to 9 of the 25 participants (i.e., 36%) in the abstract condition. There was no between-condition difference in participants' belief that signing up to the study would be the right thing to do,  $t(48) = 0.56, p = .58$ .

A series of independent samples  $t$ -tests examined whether the abstract and concrete conditions differed on decision-making time and the self-report rating items (see Table 3.2 for means and standard deviations). As expected, participants in the abstract condition took longer than those in the concrete condition to decide whether they would sign-up to take part in the 3-week study,  $t(48) = 3.00, p = .004, d = 0.85$ , reported feeling less capable of completing the study,  $t(48) = 3.19, p = .003, d = 0.90$ , and experienced more indecision,  $t(48) = 2.93, p = .005, d = 0.83$ , and stress,  $t(48) = 3.27, p = .002, d = 0.92$ , during the decision-making process. There was also a trend towards significance for participants in the abstract condition reporting more regret,



$t(48) = 1.95, p = .06, d = 0.55$ , and less satisfaction with their decision,  $t(48) = 1.89, p = .07, d = 0.53$ . There was however no difference between the abstract and concrete conditions in participants' ratings of how confident they felt with their decision,  $t(48) = 0.56, p = .58$ . On account of the condition differences on the DASS-21 depression and RRS approaching significance, the analyses for each decision-making measure were repeated with both of these variables included as covariates. The pattern of findings remained the same.

Table 3.2

*Means and Standard Deviations for Decision-making Time and Self-Report Rating*

*Items*

	Condition			
	Abstract thinking ( $n = 25$ )		Concrete thinking ( $n = 25$ )	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Time (secs)	228.72	66.16	177.48	54.00
Right thing to do belief	3.68	0.80	3.52	1.19
Completion capability	2.32	0.95	3.24	1.09
Indecision	3.00	1.15	2.16	0.85
Stress	2.72	1.14	1.76	0.93
Regret	2.20	1.08	1.64	0.95
Satisfaction	2.72	0.84	3.24	1.09
Confidence	3.32	1.11	3.48	0.92

*Note.* Ratings were provided on a 5-point scale, where 1 = *not at all*, and 5 = *very much*.

## Discussion

Study 3 aimed to test whether concrete thinking would lead to higher levels of

proactivity than abstract thinking in a sample of high dysphoric individuals. As expected, significantly more participants in the concrete condition signed up to take part in the 3-week study. This difference emerged despite the fact that there was no difference in the extent to which participants in the two conditions believed that signing-up to the study was the right thing to do.

The higher levels of proactivity in the concrete condition compared to the abstract condition are consistent with other differences observed between the conditions. Specifically, participants in abstract condition reported lower levels of belief in their capability to complete the 3-week study relative to those in the concrete condition. This finding might be explained by evidence that abstract thinking increases negative self-evaluations (Rimes & Watkins, 2005) and negative future thinking in depression (Lavender & Watkins, 2004), and also positively correlates with higher levels of worry (Stober & Borkovec, 2002; Stober et al., 2000). Indeed, negative self-beliefs and worry about the idea of participating in the 3-week study were more apparent in the statements written by participants in the abstract condition during the thinking induction. For example, one participant wrote: *“I worry that taking on such a huge commitment will overwhelm me with the amount of work I will need to do for the study every day”*.

Participants in the abstract condition also reported that they experienced more stress and indecision during the decision-making process, and took longer to arrive at a decision, compared to participants in the concrete condition. This finding is consistent with the results of Schiena et al. (2013) who found that 1) indecision was positively correlated with abstract thinking and negatively correlated with concrete thinking, and 2) abstract thinking led to longer decision-making times than did concrete thinking. A

greater sense of stress and indecision during the decision-making process may have increased the likelihood of participants defaulting to the non-committal choice option of not signing-up to take part in the 3-week study. In line with this notion is evidence that worry is positively correlated with avoidance (Dickson, Ciesla, & Reilly, 2012).

It was interesting and unexpected, however, that participants in the abstract and concrete conditions did not differ in the extent to which they felt regret, satisfaction, or confidence with their decision (although there was a trend towards participants in the abstract condition experiencing more regret and less satisfaction). It is possible that significant effects did not emerge on these variables because all three were rated immediately after participants made their choice, which may not have allowed sufficient time for participants to reflect on how they felt about their decision. Perhaps with more of a time lag between decision-making and the administration of these post-decision measures, the overly analytical nature of abstract thinking in combination with the negative affect present in dysphoria may lead to higher ratings of regret and lower ratings of satisfaction and confidence. It is also possible that the decision task (i.e., to sign-up or not sign-up to participate in a 3-week study) was not sufficiently personally-relevant for the thinking inductions to have a differential impact on decisional regret, satisfaction or confidence. Future research should test this possibility using a longitudinal design, and utilising more personally-relevant decision scenarios.

Overall, Study 3 demonstrated that when high dysphoric individuals engage in concrete thinking they are more proactive than when they engage in abstract thinking. These findings however emerged when participants completed a standardized, prescribed decision task (i.e., whether or not to sign-up to a future study) in an experimental context. Accordingly, it is not clear whether the abovementioned relative

effects of abstract and concrete thinking would also be observed when participants were faced with personally-relevant decision scenarios. It is important to test this question in order to increase the level of confidence in the ecological validity and clinical utility of the findings.

#### **Study 4 – The Relative Effects of Abstract versus Concrete Thinking on Proactivity towards a Personally-relevant Task**

Study 4 was conducted to assess whether concrete thinking leads to a higher level of proactivity than abstract thinking on a decision task that participants identify as personally-relevant. To do this, participants were asked to identify the ideal part-time job that they would want to apply for, underwent a thinking induction that guided them to think about applying for the job in an abstract or concrete way, and were presented with measures that indexed proactive behaviors that would maximise their chances of securing the job.

In order to extend and improve upon Study 3 in which only one measure of proactivity was administered, Study 4 included two self-report measures of proactivity and two behavioural measures of proactivity. Specifically, following their thinking induction, participants were asked to estimate the number of days before the submission deadline that they would (i) start working on their application and (ii) submit their completed application. The author then surreptitiously recorded the number of participants who elected to: (i) remain in the lab after they believed that the experiment was complete so that they could peruse an employment assistance website, and (ii) return to the lab at later date to collect a job application assistance package from the experimenter. On the self-report measures, it was hypothesised that participants in the concrete condition would indicate earlier start and completion dates than participants in

the abstract condition. For the behavioural measures, it was expected that more participants in the concrete condition would opt to look at the employment assistance website and collect the job application assistance package.

## Method

### Participants and Design

Seventy seven first-year psychology students from The University of New South Wales (UNSW Sydney) participated in the study in return for course credit.<sup>12</sup> Participants were eligible to sign-up if their online pre-screening score on the DASS-21 depression subscale met the criterion used to identify high dysphoric participants in the previous studies (i.e., a score of  $\geq 14$ ). Participants were re-administered the DASS-21 depression subscale on the day of their participation, and those who again met the criterion for high dysphoria were retained in the final sample. The author continued to test participants until there were at least 25 high dysphoric participants in each of the two conditions so as to parallel the sample size tested in Study 3. Overall, 77 participants were tested to arrive at a final sample of 51 high dysphoric participants (34 females, mean age = 19.67,  $SD = 3.41$ ). Participants in the final sample were randomly assigned to either the abstract ( $n = 26$ ) or concrete ( $n = 25$ ) condition.

### Measures

**Previously used measures.** The DASS-21 and RRS were administered to rule out the possibility that any difference between conditions on the post-manipulation measures were due to a pre-existing difference in respondents' symptoms of depression, anxiety, and stress or in their tendency to ruminate in response to sad mood. In this

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<sup>12</sup> The study received ethical approval from the UNSW Human Research Ethics Advisory Panel- Panel C (HREAP – Behavioural Sciences; approval number 2606).

study, Cronbach's alpha was .72, .79, and .77 for the DASS-21 depression, anxiety, and stress subscales, respectively; and .88 for the RRS.

**Ideal job identification task.** Participants were asked if they were currently working part-time, and if so, to indicate their current part-time position. These participants were then asked to identify another part-time job that they would consider to be more ideal for them. Those who were not currently working part-time were simply asked to identify their ideal part-time job. Participants were informed that this ideal job should be one that they could feasibly carry out from the following semester onwards, alongside their other commitments. Those participants who were already working part-time were instructed to imagine that they would be assuming this new ideal job (i.e., rather than working in their current position). The experimenter ensured that participants provided a specific job position (e.g., a position at the health psychology lab at UNSW) rather than one that was overly general (e.g., working in research), as it is reasonable to expect that thoughts about specific job positions would be more amenable to the experimental manipulations.

**Abstract versus concrete thinking manipulation.** Participants were instructed to complete a writing task designed to induce either abstract or concrete thinking. First participants were asked to imagine that the ideal job position that they had just described to the experimenter was currently being advertised, and that for the job application they would need to submit a 1000-word personal statement, an up-to-date resume, and 2 letters of recommendation.

Participants in the abstract condition then received the following instructions:

*Write out in the box below why you would want to apply for this ideal job position.*

*Come up with as many reasons as possible, and fully explain each reason in as much*

*detail as possible.* Participants in the concrete condition were provided with the following instructions: *Write out in the box below what steps you would take to prepare for and complete the job application. Come up with as many steps as possible, writing out the specific actions you would need to take for each step, in as much detail as you can.* Participants in both conditions were instructed to spend 10-15 minutes writing their response to the assigned task without concern for grammar, punctuation, or sentence structure.

**Self-report measures of proactivity.** Participants were instructed to imagine that the deadline for the job application was exactly 2 months away, and were asked to provide a realistic estimate of how many days before this deadline they would start working on their application. They were then asked to provide an estimate of the number of days before the 2-month deadline they would be likely to submit their application.

**Additional ratings items.** Participants were instructed to rate on 5-point Likert scales (where 1 = *not at all*, and 5 = *very much*) the extent to which they felt capable of: i) securing the job, ii) being able to start preparing the job application by their estimated date, iii) being able to submit the final application by their estimated date; and iv) rated the extent to which they felt motivated to apply for the job.

**Behavioural measures of proactivity.** The study was designed so that although participants were informed that it would take an hour to complete, it would in fact take a maximum of 40 minutes. Immediately after participants completed the rating items on proactivity, the experimenter informed them that before they would be debriefed about the study they would be given some information that would hopefully be of service to them. The experimenter truthfully explained that she was completing her Masters and

PhD in organisational psychology, and that she worked as a careers consultant for some time during the previous year. She explained that most of her clients were university students who were unaware that the university provides many free resources that can assist them with the process of finding a job. The experimenter then opened the university's careers and employment website on the computer, and explained to the participant that by logging into the website with their student ID they could access a range of resources, including interview and resume writing workshops, as well as tips and advice on how to best apply for jobs. The experimenter explained that due to the fact that they completed the study early, they could spend some time viewing the website in the lab if they wished. The experimenter also informed participants that due to her background in careers consulting, she had access to a package of documents that could assist them in applying for jobs, and that if they wished, they could email her sometime during the week to arrange to collect this (free) information package. The experimenter then reminded participants that they were welcome to spend some time on the university's careers and employment website or could instead leave early. The experimenter surreptitiously recorded which participants chose to look at the website, and for how long. The experimenter also recorded which participants sent an email to arrange to collect the application-assistance package, and how long after their scheduled study session they sent the email.

### **Procedure**

After arriving at the lab, participants provided informed written consent, and then completed the DASS-21 and RRS. They next indicated their ideal job, and then completed the writing task that prompted them to process the idea of applying for the job position in either an abstract or concrete way. As the writing task was completed



online, the experimenter was blind to each participant's condition. After the writing task, participants completed the self-report measures of proactivity as well as the additional rating items, after which the experimenter informed them that the study was complete. Participants were given information regarding the university's careers and employment website, and at the end of the debriefing were given the option to stay back to peruse the website or to leave the lab early. They were also informed that they could email the experimenter to arrange to collect a job-application assistance package at a later date. After the debriefing (during which participants were informed about the broad goals of the study, but not the specific hypothesis about a between-condition difference in the likelihood of collecting the job application package), participants were thanked for their participation.

## **Results**

For all statistical analyses an alpha level of .05 was again used.

### **Sample Characteristics**

Means and standard deviations of sample characteristics are presented in Table 3.3. The final sample had a mean DASS-21 depression score of 22.31 ( $SD = 6.54$ ), suggesting that on average participants had a 'severe' level of depressive symptoms (according to DASS-21 depression cut-offs; Lovibond & Lovibond, 1995).

To check that there were no pre-existing between-condition differences, a series of independent samples *t*-tests was conducted with age, DASS-21 depression, DASS-21 anxiety, DASS-21 stress, and RRS as the dependent variables. Randomization was effective; that is, there were no between-condition differences in age,  $t(49) = 0.05$ ,  $p = .96$ , DASS-21 depression,  $t(49) = 1.21$ ,  $p = .23$ , DASS-21 anxiety,  $t(49) = 0.39$ ,  $p = .70$ , DASS-21 stress,  $t(49) = 0.91$ ,  $p = .37$ , or the RRS,  $t(49) = 0.60$ ,  $p = .55$ . A Pearson's

chi-square analysis revealed that there was no difference in gender distribution between the two conditions, ( $\chi^2(1, N = 51) = 0.04, p = .84$ ).

Table 3.3

*Means and Standard Deviations for Participant Characteristics and Self-Report*

*Measures*

	Condition			
	Abstract thinking ( $n = 26$ )		Concrete thinking ( $n = 25$ )	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Age	19.69	2.60	19.64	4.14
DASS-21 depression	21.23	5.66	23.44	7.29
DASS-21 anxiety	13.46	8.86	14.40	8.12
DASS-21 stress	20.08	8.59	22.16	7.70
RRS	59.00	9.97	60.72	10.61

**Manipulation Check**

In order to check that the manipulation had the intended effects, an independent *t*-test was conducted to compare ratings of levels of abstractness of the writing task. Using the same coding scheme employed in Studies 1, 2, and 3, two raters blind to condition coded the written responses, one of whom had coded the written responses from Study 3. Interrater reliability was high, with an intraclass correlation of .94. As anticipated, the written responses of participants in the abstract condition were rated as significantly more abstract ( $M = 1.69, SD = 0.63$ ) than those in the concrete condition ( $M = 4.64, SD = 0.59$ ),  $t(49) = 17.22, p < .001, d = 4.83$ .

### Self-Report Measures of Proactivity

The next set of analyses tested the hypothesis that participants in the abstract condition would demonstrate less proactivity in their responses on the self-report measures. A series of independent samples *t*-tests was carried out with the variables listed in Table 3.4 as the dependent variables. Contrary to expectations, there was no significant difference between participants in the abstract and concrete conditions in the number of days prior to the deadline that they estimated they would start drafting their application,  $t(44) = 1.32, p = .19$ , or in the number of days prior to the deadline that participants indicated that they planned to submit their final application,  $t(46) = 0.46, p = .65$ .<sup>13</sup>

### Additional Rating Items

There were no significant differences between conditions in participants' ratings of how capable participants felt of being able to commence the job application by their estimated date,  $t(49) = 0.31, p = .76$ , and in how capable they felt of being able to submit the final application by their estimated date,  $t(42.81)^{14} = 1.06, p = .30$ . In addition, there was no significant between-condition difference in ratings of how capable participants felt of being able to obtain the position,  $t(49) = 1.19, p = .24$ , nor in their ratings of how motivated they felt to apply for the job,  $t(43.63)^{15} = 0.99, p = .33$ . See Table 3.4 for means and standard deviations.

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<sup>13</sup> A number of participants ( $n = 5$  for first item;  $n = 9$  for second item) provided an estimated time *range* (e.g., 2-3 days) rather than a specific number of days (e.g., 2). In such cases, the median value was used. There were also several participants ( $n = 4$  for first item;  $n = 3$  for second item) who provided time estimates that were ambiguous and not possible to interpret (e.g., "as soon as possible, at least a week before the deadline"). Participants who provided such responses were excluded from the analyses for this item.

<sup>14</sup> Test statistic reported on adjusted df due to unequal variances (based on Levene's test).

<sup>15</sup> Test statistic reported on adjusted df due to unequal variances (based on Levene's test).

Table 3.4

*Means and Standard Deviations for Self-Report Measures of Proactivity and Additional Rating Items*

	Condition			
	Abstract thinking ( $n = 26$ )		Concrete thinking ( $n = 25$ )	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Draft application	20.81	16.71	27.89	19.58
Final submission	10.65	14.18	9.02	10.26
Job capability	2.54	0.95	2.88	1.09
Draft application capability	3.54	1.21	3.64	1.11
Final submission capability	3.65	1.23	3.96	0.79
Job motivation	3.62	1.30	3.92	0.86

*Note.* *Draft application* = estimated number of days pre-deadline that they would start drafting an application; *Final submission* = estimated number of days pre-deadline that they would submit final application. For remaining items, ratings were provided on a 5-point scale, where 1 = *not at all*, and 5 = *very much*.

### **Behavioural Measures of Proactivity**

With respect to the behavioural measures, the findings were as expected (see Table 3.5 for means). The odds ratio was such that participants in the concrete condition were 7 times more likely to look through the careers and employment website at the completion of the experiment compared to those in the abstract condition, ( $\chi^2(1, N = 51) = 9.21, p = .002$ ). Of those participants who chose to look at the website, participants in the concrete condition appeared to have spent more time on the website

than those in the abstract condition. This inference was based on the patterns of means; cell sizes ( $n = 4$  for abstract condition;  $n = 14$  for concrete condition) were too small to permit statistical analysis. Compared to the abstract condition, participants in the concrete condition were 6.75 times more likely to email the experimenter to arrange a date to collect the careers application assistance package, ( $\chi^2(1, N = 51) = 6.04, p = .01$ ). Of those who did email the experimenter, there was no difference between conditions in the number of days that participants took to send an e-mail,  $t(9) = .41, p = .70$ . All participants in both conditions collected the package on their scheduled date.

Table 3.5

*Outcomes for Behavioural Measures of Proactivity*

	Condition			
	Abstract thinking ( $n = 26$ )		Concrete thinking ( $n = 25$ )	
	<i>n</i>	%	<i>n</i>	%
Participants who visited the website	4	15	14	56
Participants who collected the package	2	8	9	36
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Time spent on website (seconds)	138.75	38.05	338.79	100.26
Number of days to send e-mail requesting package	1.50	0.71	1.33	0.50

## Discussion

Study 4 tested the effects of abstract versus concrete thinking on the extent to which participants self-reported and displayed behaviours that demonstrated proactivity in applying for their ideal part-time job. Unexpectedly, there was no impact of thinking style on the self-report measures on proactivity, nor on the rating items that indexed capability and motivation. There was however an effect of condition on the behavioural measures on proactivity, in line with predictions. Relative to the abstract condition, a greater number of participants in the concrete condition opted to stay back after the experiment to search an employment assistance website and, after leaving the lab, emailed the experimenter to later return to the lab to collect a job application assistance package. This pattern of findings is consistent with those of Study 3, in which a greater number of participants in the concrete condition, relative to the abstract condition, signed-up to a future 3-week study. That is, in both studies high dysphoric participants demonstrated greater levels of behavioural proactivity following a concrete thinking induction compared to an abstract thinking induction.

Before proceeding to the General Discussion of Studies 3 and 4, it is worth pointing out that administering the same assigned task to all participants (i.e., to think about applying for a job) may have limited the ecological validity of the findings of Study 4. Despite the fact that university students are quite likely to be in the job market, a number of participants may have been uninterested in thinking about applying for a part-time job at the time they took part in the study. In fact, across all participants, the average rating of task motivation (3.77 on a scale of 1 = not at all, and 5 = very much) was not particularly high. Future research could consider employing an open-ended task

that gives participants the opportunity to come up with a personally relevant task of their own choosing.

### **General Discussion**

The goal of Studies 3 and 4 was to assess the relative effects of abstract versus concrete thinking on proactivity in high dysphoric participants. Both studies demonstrated that participants who were instructed to think about a task in an abstract way demonstrated higher levels of behavioural proactivity compared to those who were instructed to think about the task concretely. To the author's knowledge, no study in the published literature (either clinical or non-clinical) has compared the consequences of these two thinking styles on proactivity in the context of depression.

The similarities between forming an implementation intention and engaging in an action-oriented concrete style of thinking could provide one potential account of why, relative to abstract thinking, concrete thinking resulted in greater behavioral proactivity. Forming an implementation intention involves specifying when, where, and how one will follow a goal-directed behavior. This is comparable to the requirements of the writing task that participants in the concrete condition completed as their thinking induction: participants were asked to write about how they would participate in the 3-week study or apply for their ideal job, answering questions such as "*Write out the steps you would have to take to...*". In studies that have examined the effects of forming implementation intentions, individuals who form such intentions are more motivated to follow through with their intention, and indeed more likely to actually do so, compared to those who do not (e.g., Armitage, 2004; Sheeran & Orbell, 1999, 2000). Given that the format of producing an implementation intention mirrors the instructions of the concrete thinking induction employed in the two studies presented in this chapter, it is

possible that the motivational effects of implementation intentions played a role in the finding of greater behavioral proactivity in the concrete conditions. Future research in this area could test this possibility.

It is also possible that in addition to concrete thinking facilitating behavioural proactivity, the evaluative nature of abstract thinking inhibited action. Processing a scenario in an abstract way (e.g., thinking about the meaning and consequences of certain actions) may in the context of high levels of depressive symptoms generate overly analytical or negative thoughts (e.g., “Why would I want to add more work to my life?”) that may serve to dissuade an individual from engaging in proactive behaviour. This possibility is consistent with evidence that abstract thinking is linked to worry (Stober & Borkovec, 2002; Stober et al., 2000), indecisiveness (Schiena et al., 2013), as well as more likely to promote negative self-evaluations (Rimes & Watkins, 2005) and negative future thinking (Lavender & Watkins, 2004) relative to concrete thinking.

One possibility that cannot be ruled out is that implicit demand characteristics in the concrete thinking instructions may have influenced the findings of both experiments. Specifically, the instructions in the concrete condition in Study 3 were worded in such a way that they guided participants to complete the writing task (e.g., “*write out how you would incorporate the study into your schedule*”) under the assumption that they would indeed sign up to take part in the 3-week study. On the other hand, the instructions in the abstract induction (e.g., “*What are some potential consequences of participating in this study?*”) may have been more likely to prompt participants to consider both choice options (i.e., signing-up and not signing-up). Similarly, in Study 4, the instructions in the abstract condition were perhaps more likely



to encourage participants to consider both choice options (to apply or not to apply for the part-time job) – in contrast to the concrete instructions. Participants in the concrete condition were asked to write about how they would prepare for and complete the job application, whereas participants in the abstract condition were asked to write about why they would want to apply for the position. The possibility that the differences in the wording of the manipulations may have had these unintended implicit demand effects is an important issue for researchers to consider in future studies in this line of work.

Whilst the findings on the impact of abstract versus concrete thinking on behavioural proactivity were as expected, it was surprising that there was no effect of the thinking induction on the self-report measures of proactivity in Study 4. Perhaps this dissociation was due to the personal relevance of the decision scenario in Study 4. That is, given that in both conditions participants were instructed to think about a job they wanted (and presumably knew something about) perhaps they had similar levels of insight into their ability to complete the application process – and as such, their self-reported measures of proactivity were not influenced by the mode of processing they had been instructed to adopt. However when the opportunity to take action (i.e., to peruse the website or pick up an assistance package) arose, perhaps participants in the concrete condition were more ready to explore those steps than those in the abstract condition. There is evidence from a neurological study to suggest that concrete thinking is more likely to prime action than abstract thinking. Spunt, Falk, and Lieberman (2010) found that thinking about a task in a concrete manner was associated with activity in areas of the brain implicated in action execution (e.g., the dorsal and ventral aspects of the premotor cortex). On the other hand, thinking about a task in an abstract manner was linked to areas of the brain involved in processing agency and mental states (e.g., the

dorsomedial prefrontal cortex), which do not have strong links to the motor processing regions of the brain. Future studies with a longitudinal experience sampling design could be particularly useful to more rigorously test the impact of abstract versus concrete processing on self-report versus behavioural measures of proactivity, and to help tease apart the observed dissociation.

Overall, the findings of Studies 3 and 4 demonstrated that relative to concrete thinking, abstract thinking lowers the likelihood of engaging in proactive behaviours. These findings, in conjunction with those of Study 2, suggest that abstract thinking has negative effects on an individual's decision-making around engaging in productive behaviours. Study 2 specifically demonstrated this with respect to the length of time it took for participants to complete a task that they were encouraged to complete as early as possible, and Studies 3 and 4 found this with respect to the likelihood of engaging in proactive behaviours. It is unclear, however, if the negative effects of abstract thinking also extend to post-decision cognitions and behaviour. That is, whilst there is evidence that thinking abstractly about a present or future decision task can lead to unconstructive outcomes, no study has yet tested whether thinking abstractly about a past decision can also yield negative effects. Abstract thinking could, for example, lead to higher levels of regret over a past decision as compared to when thinking concretely about that decision. This seems particularly likely on the basis that depressed individuals who ruminate about and lament past decisions are likely to frequently entertain abstract thoughts about the decision, such as the implications, consequences, and meanings of one's past actions.

It is important to conduct research that not only examines the factors that contribute to or lessen difficulties with the decision-making process itself, but also to

investigate problems that emerge post-decision making. There is growing evidence that post-decision cognitions and behaviours are important to examine given their influence on subsequent decision-making (Zeelenberg & Pieters, 2007). One example of a post-decision outcome that warrants further investigation in the context of depression is post-decisional regret. There is evidence that in comparison to non-depressed individuals, clinically depressed (Kraines et al., 2017) as well as mildly depressed individuals (Monroe et al., 2005) report significantly higher levels of regret. These elevated levels of regret may produce a number of significant problems.

For example, post-decisional regret might increase a depressed individual's feelings of hopelessness and worthlessness, promote a sense that they are incapable of positively shaping their future, and lead to or reinforce their tendency to avoid decision-making altogether. These possibilities are supported by evidence that regret is a significant predictor of depressive symptoms (Broomhall, Phillips, Hine, & Loi, 2017), and linked to higher levels levels of self-attacking cognitions (Schmidt, Renaud, & Van Der Linden, 2011), hopelessness, suicidal ideations (Bruine de Bruin, Dombrovski, Parker, & Szanto, 2015), anxiety (Roese et al., 2009), decision avoidance (Zeelenberg & Pieters, 2007), and a reduced quality of life (Clark, Wray, & Ashton, 2001). There is also longitudinal evidence that an individual's ability to resolve regret (i.e., report that they no longer felt regret or had come to terms with an event they regretted) predicts higher levels of wellbeing, and lower levels of depression and rumination over time (Torges, Stewart, & Nolen-Hoeksema, 2008). A tendency to experience post-decisional regret may also contribute to difficulties with the decision-making outcomes indexed in Studies 2 – 4 (i.e., poor decision latency and low levels of behavioural proactivity). Overall, research that examines drivers of post-decisional regret is of clinical value and

has the potential to generate a richer understanding of decision-making difficulties in depression. To this end, Studies 5 and 6 were conducted to assess whether abstract thinking may increase the experience of post-decisional regret, relative to concrete thinking.

## **CHAPTER 4: The Relative Effects of Abstract versus Concrete Thinking on the Experience of Post-decisional Regret**

Abstract thinking may underpin the high levels of post-decisional regret that are characteristic of individuals with depression (Monroe et al., 2005). Thinking about a past decision in an abstract way involves thinking about the higher-order aspects of the decision such as its significance, implications, and consequences. In depression, a focus on such aspects, combined with the negative cognitive bias that is present in the disorder, is likely to produce negative thought content, and thereby potentially exacerbate the sense of regret that an individual experiences about their decision. Furthermore, given its cross-situational nature, abstract thinking may also lend itself to counterfactual thinking - that is, thinking about what could have been - which has been found to correlate with higher levels of regret (Epstude & Jonas, 2015; Tsiros & Mittal, 2000). Following from the idea that abstract thinking may facilitate the experience of post-decisional regret is the possibility that shifting individuals into adopting the converse, more adaptive style of thinking (i.e., concrete thinking) might in turn reduce the experience of post-decisional regret. Thinking concretely about a past decision, for example, might enable the individual to be more likely to appraise their decision in a more logical step-by-step manner, to be less likely to entertain ‘what if’ thoughts, and to subsequently feel less regret over having made the decision.

To date, no study has tested the relative consequences of abstract versus concrete thinking for post-decisional regret. Guided by this gap in the literature, and a recognition of the value of investigating potential drivers of post-decisional regret in depression, two studies were conducted to examine the effect of thinking abstractly versus concretely about a past decision on the subsequent experience of regret over that

decision. Both studies tested the hypothesis that abstract thinking leads to higher levels of post-decisional regret as compared to concrete thinking.

It is important to note that Studies 5 and 6 included an addition to the design that was informed by a limitation of the preceding experimental studies. Specifically, in Studies 2 to 4 ratings of mood were not indexed before and after the thinking inductions. Accordingly, it is possible that the inductions manipulated mood such that abstract thinking worsened mood, and that this in turn led to the worse outcomes observed in the abstract condition relative to the concrete condition (i.e., longer decision latency and lower levels of behavioural proactivity). Whilst this is unlikely given that numerous studies with non-clinical samples (e.g., Moberly & Watkins, 2006; Watkins, Moberly, & Moulds, 2008) and clinical samples of depressed individuals (Watkins & Teasdale, 2001, 2004) have demonstrated that these manipulations do not have differential effects on mood, pre and post-manipulation ratings of mood were nonetheless obtained in the next two studies. The author intended to rule out the possibility that differential mood effects may account for any between-condition differences that emerge on the regret measures.

#### **Study 5 – A Preliminary MTurk Study on the Relative Effects of Abstract versus Concrete Thinking on Post-decisional Regret**

Study 5 was conducted as an initial investigation into the relationship between abstract versus concrete thinking and the experience of post-decisional regret. The study was conducted on Amazon's Mechanical Turk (MTurk) website to maximise the efficiency of data collection. In contrast to Studies 1 to 4, participants were not selected on the basis of their level of depressive symptoms. For Studies 1 to 4, it was possible to exercise precautions to minimize the risks associated with testing high dysphoric

individuals. For example, all participants were debriefed in-person and received a referral sheet that listed the contact details of relevant psychological services. Any participants who endorsed the most severe response option for the majority of the DASS-21 depression items also received an additional debriefing at the completion of the study. Specifically, they were informed that their responses on the mood questionnaires suggested that they might be having a difficult week, and that with their permission, the experimenter could arrange for them to talk to a clinical psychologist. Study 5 however was conducted on the online platform MTurk. As a result, there were ethical concerns about being unable to screen for risk and (where relevant) to refer participants to treatment in-real time, especially given the fact that the study required participants to think at length about personally-important decisions that they regret having made. Due to these concerns, an unselected sample of participants was employed in Study 5. That is, in the present study participants were unselected, and thus had a range of DASS-21 depression scores. The findings nonetheless speak to clinical implications, given depressed individuals' well-documented tendency to engage in abstract thinking (Watkins, 2016).

The aim of Study 5 was to test the hypothesis that abstract thinking is associated with higher levels of post-decisional regret than concrete thinking. This hypothesis was tested in two ways: first in a correlational design and then in an experimental design. Participants were asked to complete two writing tasks – each on a separate decision that they had made in the past - and to subsequently rate their levels of regret about the decision. In the first writing task, participants were not instructed to adopt either an abstract or a concrete thinking style. Instead, they were simply asked to write down the thoughts that came to mind when they reflected upon the decision. It was

predicted that the decisions for which participants naturally adopted a more abstract thinking style would have higher ratings of regret. The second writing task involved a thinking induction to compare the relative effects of abstract versus concrete reflection on subsequent regret ratings. That is, participants were instructed to think either abstractly about the reasons they made their decision, or concretely about the steps they took to make the decision. It was predicted that participants in the abstract condition would report higher levels of post-decisional regret than participants in the concrete condition.

## **Method**

### **Participants and Design**

Seventy two participants were recruited through MTurk, an online crowdsourcing platform shown to produce data comparable in quality and findings to other methods of recruiting undergraduate and clinical samples (Arditte, Cek, Shaw, & Timpano, 2016; Chandler & Shapiro, 2016; Shapiro, Chandler, & Mueller, 2013). Participants were restricted to individuals of at least 18 years of age, who currently lived in the United States. Participants received \$US2.85 in exchange for completing the 45-minute study. An English fluency check in which participants were required to describe a photograph, as well as four attention checks (e.g., “*Choose ‘Sometimes’ as your response to this survey item*”) were embedded in the study. Participants who failed at least one check ( $n = 14$ ) were not included in the analysis. The final sample consisted of 58 participants (28 females, mean age = 32.78;  $SD = 10.79$ ), who were randomly allocated to either the abstract ( $n = 29$ ) or concrete ( $n = 29$ ) condition. Of the 58 participants, 24 (i.e., 41.38%) had a score of 14 or above on the DASS-21 depression subscale, and thus at minimum a moderate level of depressive symptoms according to



DASS-21 cut-offs (Lovibond & Lovibond, 1995). The study was approved by the Yale University Human Subjects Committee (IRB: 1505015943).

## Measures

**Decision-reflection writing tasks.** Participants were instructed to write about two personally important decisions that they had made in the past six months. The first writing task was administered as a measure of naturally-occurring abstract versus concrete thinking. Participants were asked to identify a decision that had some negative impact on them and then instructed to write out *“the thoughts that come to mind when you think about that decision”*. The second writing task was designed to induce abstract versus concrete thinking. Participants were asked to identify another decision (i.e., a different decision to the one they reflected on in the first task) that they regret having made. In the abstract condition participants were instructed to *“write out why you made the decision, as well as the consequences, meaning, and implications of your decision”*. Participants in the concrete condition were instructed to *“write out how you made the decision, specifying the steps you took (in your mind and/or behaviourally) to make the decision”*. Participants were asked to spend 7-10 minutes on each writing task, and to complete a number of ratings before and after each writing task.

**Pre-writing task rating items for the first writing task.** Prior to engaging in the first writing task, participants completed two rating items. They rated the personal importance of their decision and the extent to which they had thought about the decision since they made it.

**Post-writing task rating items for the first writing task.** Immediately after completing the first writing task, participants rated the extent to which they regretted their decision and the extent to which they felt sad when they thought about it.

**Pre-writing task rating items for the second writing task.** As was the case for the first writing task, before writing about their decision participants rated the personal importance of the decision and the extent to which they had thought about the decision since they made it. They also completed a number of additional rating items. They rated the extent to which they felt sad when they thought about their decision, the extent to which they regretted their decision, the extent to which they could see how things could have turned out better, the extent to which they could see how things could have turned out worse, the extent to which they felt confident in their ability to make decisions, and the extent to which they currently felt sad and happy. These items were administered to rule out the possibility that any condition differences in the post-manipulation regret measures could be accounted for by differences in these pre-manipulation measures. All ratings were provided on a 7-point scale, where 1 = *not at all*, and 7 = *very much*.

**Post-writing task rating for the second writing task.** Immediately after completing the second writing task, participants rated the extent to which they regretted their decision and the extent to which they felt sad when they thought about it. The pre-manipulation ratings items that indexed counterfactual thinking, decision-making confidence, and mood were also re-administered. All ratings were provided on a 7-point scale, where 1 = *not at all*, and 7 = *very much*. Participants also completed the Regret Elements Scale (Buchanan, Summerville, Lehmann, & Reb, 2016) with respect to their regretted decision (see the description of the scale below for further details).

**Previously used measures.** The DASS-21 and RRS were administered. In this study  $\alpha = .90$ ,  $.87$ , and  $.84$  for the depression, anxiety, and stress subscales, respectively, and  $.95$  for the RRS.

**Regret Elements Scale (Buchanan et al., 2016).** The Regret Elements Scale is a 10-item questionnaire which consists of two subscales of items that index affective regret (e.g., *“I feel like kicking myself”*) and cognitive regret (e.g., *“I wish I had made a different decision”*). The items are rated on a 7-point scale (from 1 = *strongly disagree* to 7 = *strongly agree*). This scale was administered twice. Participants first completed the scale following the abstract or concrete thinking induction, and rated the items with respect to the decision that they had just thought about. Participants completed the scale again at the end of the study as a general trait measure of regret, and this time the original instructions for the scale was amended such that participants were requested to rate the items with respect to how they typically feel and think after they make decisions. The Regret Elements Scale possesses strong psychometric properties (Buchanan et al., 2016). In this study, Cronbach’s alpha was .94 for both the affective regret and cognitive regret subscales.

**Regret Scale (Schwartz et al., 2002).** The Regret Scale is a 5-item questionnaire that indexes the extent to which respondents typically experience doubt over their decisions or regret over what they have missed out on due to their decisions. Participants rate each item (e.g., *“when I think about how I’m doing in life, I often assess opportunities I have passed up”*) on a 7-point scale where 1 = *completely disagree* and 7 = *completely agree*. In this study, Cronbach’s alpha was .84.

**Counterfactual Thinking for Negative Events Scale (CTNES; Rye, Cahoon, Ali, & Daftary, 2008).** The CTNES is a 16-item questionnaire which consists of four subscales that assess different indices of counterfactual thinking: (a) Non-Referent Downward counterfactuals (e.g., *“I think about how much worse things could have been”*), (b) Other-Referent Upward counterfactuals (e.g., *“If another person (or other*

people) had not been so inconsiderate, things would have been better”), (c) Self-Referent Upward counterfactuals (e.g., “*I wish I had a time machine so I could just take back something I said or did*”), (d) Non-Referent Upward counterfactuals (e.g., “*I think about how much better things could have been*”). Participants were instructed to think of a recent event that had a negative impact on them, and to indicate the extent to which they had experienced the types of thoughts described in the items in response to the event (e.g., “*I think about how much better things would have been if I had acted differently*”). Items were rated on a 5-point scale, where 1 = *never*, and 5 = *very often*. The CTNES possesses very good psychometric properties (Petrocelli & Dowd, 2009). Cronbach’s alpha for the Nonreferent Downward, Other-Referent Upward, Self-Referent Upward, and Nonreferent Upward subscales in this study were respectively .90, .85, .79, and .68.

The CTNES, DASS-21, RRS, Regret Element Scale, and the Regret Scale were administered to rule out the possibility that any between-condition differences in post-decisional regret could be due to potential between-condition differences in these trait measures.

## **Procedure**

Participants were first asked to provide online consent, and to state their age and gender. Participants were then asked to identify a decision that they had made in the last 6 months that had some negative impact on them. They completed the pre-writing task rating items, spent 7-10 minutes writing out the thoughts that came to mind when they reflected on that decision, and then provided their post-writing task ratings. Participants next identified a second decision that they had made in the last 6 months that they now regret making. With respect to that decision, they completed the pre-writing task rating

items, the abstract or concrete writing task, and then the post-writing task rating items. Finally, participants completed the DASS-21, RRS, Regret Elements Scale, Regret Scale, and CTNES.

## **Results**

For all statistical analyses an alpha level of .05 was used. Effect sizes for MANCOVAs and follow-up ANCOVAs are reported as partial eta-squared, whereby values up to .01 refer to small, .06 to moderate, and .14 to large effect sizes (Cohen, 1988).

The first set of analyses tested the hypothesis that ratings of post-decisional regret are more strongly associated with naturally occurring abstract thinking than with concrete thinking. The second set of analyses tested the hypothesis that abstract thinking results in greater levels of post-decisional regret than does concrete thinking.

### **Coding of Abstract versus Concrete Thinking in Written Responses**

Participants' written responses for each of the two decisions were coded for the degree to which they were abstract versus concrete using the same coding scheme employed in the previous studies. Two independent raters each coded all 116 decision-reflections. Both raters were blind to condition and to the purpose and hypotheses of the study. Interrater reliability was high, with an intraclass correlation of .91 for the first decision-reflection and .94 for the second decision-reflection.

### **Correlation between Naturally-Occurring Abstract versus Concrete Thinking and Post-decisional Regret**

As anticipated, there was a significant bivariate correlation between ratings of naturally-occurring abstract thinking and ratings of post-decisional regret. Specifically, the more abstract participants' reflections on their decision (i.e., in the first writing

task), the higher the level of post-decisional regret they subsequently reported experiencing ( $r = -.46, p < .001$ ). A hierarchical regression was also conducted with scores of depressive symptoms entered as a covariate - to rule out the possibility that this relationship was not simply an artefact of a significant association between depressive symptoms and regret ratings. DASS-21 depression scores were entered on the first step, and the ratings of abstractness of thought entered as the predictor on the second step. Even after controlling for depressive symptoms, abstract thinking was a significant predictor of regret ratings (Adjusted  $R^2 = .19$ ; abstractness ratings: unstandardized  $\beta = -.73, SE = .19, t = 3.90, p < .001$ ). There was no significant bivariate correlation between ratings of abstractness of thought and ratings of sadness ( $r = -.10, p = .46$ )

### **Baseline Checks**

To check that there were no pre-existing differences between conditions prior to the second writing task, a series of independent samples  $t$ -tests was conducted on age, trait measures, and the pre-writing ratings items for the second writing task. Between-condition differences only emerged on the DASS-21 anxiety subscale. Hence, all subsequent analyses that examined the effect of the inductions on post-writing task measures were conducted with DASS-21 anxiety scores entered as a covariate. See Table 4.1 and 4.2 for tables of means, standard deviations, and  $t$ -test scores.

Table 4.1

*Means, Standard Deviations, and T-Test Scores for Age and Trait Measures According to Condition*

	Condition					
	Abstract thinking		Concrete thinking		<i>T</i> -Test scores	
	<i>(n</i> = 29)		<i>(n</i> = 29)			
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>
Age	35.38	10.92	30.17	10.18	1.88	.07
DASS-21 depression	9.24	9.63	13.52	10.94	1.58	.12
DASS-21 anxiety	5.17	6.13	12.55	10.04	3.38	.001
DASS-21 stress	12.62	8.98	14.34	9.49	0.71	.48
RRS*	44.91	16.15	49.68	13.03	1.13	.27
Regret Elements-						
affective regret	21.38	8.95	22.41	7.36	0.48	.63
Regret Elements-						
cognitive regret	23.38	8.99	23.00	5.74	0.19	.85
Regret Scale	20.97	5.22	21.28	4.65	0.24	.81
CTNES Non-ref down	12.10	4.49	12.52	2.73	0.42	.67
CTNES Other-ref up	10.73	4.50	11.90	3.44	1.09	.28
CTNES Self-ref up	11.62	3.90	12.24	2.54	0.72	.48
CTNES Non-ref up	12.17	3.08	12.79	2.35	0.86	.39

Note: A higher score reflects a greater level of the indexed variable.

\*For 10 participants there was a computer error such that Qualtrics produced multiple responses (e.g., 2 and 3) for numerous items on the RRS. Accordingly, the author removed all participants with multiple values from the analysis of the RRS. As a result,

23 participants remained in the abstract condition while 25 remained in the concrete condition.

Table 4.2

*Means, Standard Deviations, and T-Test Scores for Pre-Manipulation Ratings*

*According to Condition*

	Condition					
	Abstract thinking		Concrete thinking		T-Test scores	
	(n = 29)		(n = 29)			
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>
Importance	5.28	1.33	5.31	1.07	0.11	.91
Thought					0.21	.83
frequency	5.17	1.44	5.24	0.99		
Sadness at					0.21	.83
decision	5.03	1.38	5.10	1.08		
Regret	5.72	1.25	5.24	0.99	1.63	.11
Turn better	4.79	1.82	5.03	1.05	0.62	.54
Turn worse	3.90	1.92	4.41	1.57	1.13	.27
Confidence	5.28	1.36	5.00	1.16	0.83	.41
Sad mood	3.76	1.96	3.93	1.51	0.38	.71
Happy mood	3.69	1.77	3.52	1.35	0.42	.68

*Note.* Importance = personal importance of decision; Thought frequency = frequency of thinking about decision since making it; Sadness at decision = sadness felt when thinking about the decision; Regret = regret over decision; Turn better/worse= extent to which things could have turned out better/worse; Confidence = confidence as decision-maker; Sad mood = current sadness; Happy mood = current happiness. All ratings were provided on a 1-7 scale, where a higher score reflects a greater level of the variable.



### **Manipulation Check**

In order to check that the manipulations were effective, an independent  $t$ -test was conducted with ratings of levels of abstractness versus concreteness of the writing task as the dependent variable. As anticipated, there was a significant between-condition difference,  $t(49) = 16.03, p < .001$ . Based on a rating scale where 1 = abstract and 5 = concrete, the mean rating (across the two raters) was 1.45 ( $SD = 0.55$ ) for the abstract condition and 4.47 ( $SD = 0.85$ ) for the concrete condition.

There was also, however, an unexpected difference between conditions in the time that participants spent on the writing task,  $t(35) = 2.78, p = .009$ , such that participants in the abstract condition on average wrote for 7.59 minutes ( $SD = 0.73$ ), whilst participants in the concrete condition on average spent 8.69 minutes ( $SD = 1.98$ ) writing. Hence, for all subsequent analyses, both the time spent completing the writing task and DASS-21 anxiety scores were entered as covariates.

### **Effect of Thinking Induction on Post-decisional Regret**

With time spent completing the writing task and DASS-21 anxiety scores entered as covariates, a multivariate analysis of covariance (MANCOVA) was conducted to assess the effect of condition on post-decisional regret. The general regret rating item, affective regret subscale, and cognitive regret subscale were entered as the dependent variables. The MANCOVA supported the hypothesis that abstract thinking leads to higher ratings of regret compared to concrete thinking, Wilks's lambda = .84,  $F(3,52) = 3.29, p = .03$ , partial  $\eta^2 = .16$ . Three analyses of variance (ANCOVAs) were conducted on each dependent variable as follow-up tests to the MANCOVA. These analyses revealed that participants in the abstract condition reported higher levels of regret on the general regret rating item [ $F(1,54) = 5.73, p = .02$ , partial  $\eta^2 = .10$ ] as well

as on the affective regret subscale [ $F(1,54) = 8.71, p = .005$ , partial  $\eta^2 = .14$ ], but not the cognitive regret subscale [ $F(1,54) = 2.97, p = .09$  partial  $\eta^2 = .05$ ].<sup>16</sup> While the effect on cognitive regret did not reach significance, the pattern of means were in the expected direction. See Table 4.3 for means and standard deviations.

A second MANCOVA was conducted to test whether the higher ratings of regret in the abstract condition could be due to the induction potentially worsening mood in the abstract condition, relative to the concrete condition. The two pre-writing task mood ratings (sad, happy) were entered as covariates alongside DASS-21 anxiety scores and time spent completing the writing task, with condition (abstract, concrete) as the between-subjects factor and the two post-writing task mood ratings (sad, happy) as the dependent variables. The analysis demonstrated that when baseline mood was held constant, there was no between-condition difference in mood ratings following the writing task [Wilks's lambda = .99,  $F(2,51) = 0.24, p = .79$ ]. See Table 4.2 and 4.3 for means and standard deviations.

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<sup>16</sup> These key findings remained when the analyses were repeated without the DASS-21 anxiety scores and time spent completing the writing task entered as covariates.

Table 4.3

*Means and Standard Deviations for Post-Manipulation Ratings According to Condition*

	Condition			
	Abstract thinking ( $n = 29$ )		Concrete thinking ( $n = 29$ )	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
1. Regret	5.90	1.01	4.83	1.49
2. Affective regret	26.14	6.91	22.21	7.77
3. Cognitive regret	27.93	6.59	24.62	7.78
4. Sad mood	4.24	1.72	3.86	1.73
5. Happy mood	3.28	1.75	3.48	1.86
6. Turn better	5.31	1.69	5.52	1.48
7. Turn worse	4.34	2.06	3.97	1.74
8. Confidence	4.79	1.52	4.76	1.41
9. Sadness at decision	4.90	1.45	4.34	1.42

*Note.* Raw (rather than adjusted) means reported. Regret = general rating item indexing regret over decision; Affective regret = affective regret over decision; Cognitive regret = cognitive regret over decision; Sad mood = current sadness; Happy mood = current happiness; Turn better/worse = extent to which things could have turned out better/worse; Confidence = confidence as decision-maker; Sadness at decision = sadness felt when thinking about the decision. Ratings for items 1, 4-9 are presented as out of 7. Ratings for items 2-3 are presented as out of 35. A higher score reflects a greater level of the variable.

### **Additional Analyses**

With DASS-21 anxiety scores and time spent completing the writing task entered as covariates, a final MANCOVA was conducted to test the effect of the inductions on the remaining post-writing task rating items (items 6-9 in Table 4.3). The

items indexed the extent to which participants could see how things could have turned out better or worse, the level of confidence they felt in their decision-making ability, and the extent to which they felt sad when they specifically thought about their decision. There were no between-condition differences [Wilks's lambda = .97,  $F(4,51) = 0.44$ ,  $p = .78$ ]. Means and standard deviations are reported in Table 4.3.

### Discussion

The goal of Study 5 was twofold: first, to test the hypothesis that post-decisional regret is positively correlated with higher levels of naturally-occurring abstract thinking; second, to test the hypothesis that thinking abstractly about a personally important past decision leads to higher levels of regret than thinking concretely. The findings yielded support for both hypotheses. This is the first study to have demonstrated that inducing concrete thinking about a past decision was effective in producing lower levels of decisional regret relative to when engaging in abstract thinking.

It is important to note whilst the findings of Study 5 supported both hypotheses, among the post-manipulation rating items there were a mixture of expected and unexpected findings. First, there were no between-condition differences in the extent to which participants subsequently felt sad when they thought about the decision they made. This was in line with the finding that the thinking induction did not have a differential impact upon mood. Second, there was no difference between participants in the abstract and concrete conditions in the extent to which they felt confident as a decision-maker. This was interesting given that the higher ratings of regret following the abstract thinking induction might have suggested that the participants in the abstract condition would be more likely to question their decision-making skills. That said, the post-manipulation rating item indexed participants' confidence as a decision-maker in

general. It is possible that had the item asked participants about their likely confidence as a decision-maker when they were faced with a similar decision in the future, those in the abstract condition may have reported lower ratings of confidence.

Of particular interest, however, was the unexpected null effect of the thinking induction on the two items that indexed the extent to which participants could see how things could have turned out better (upward counterfactual thinking) or worse (downward counterfactual thinking) in the absence of their decision. Given that abstract thinking is cross-situational in nature and focuses on the higher-order aspects of a scenario such as the consequences of a past decision, it would be reasonable to predict that thinking abstractly about a regretted decision is conducive to generating thoughts of how alternative circumstances could have arisen had the decision not been made. It was therefore surprising that participants in the abstract thinking condition did not report higher ratings of the extent to which they could see how things could have turned out better or worse had they not made their decision. One possible reason for this is perhaps the two single ratings items were too simplistic (i.e., not detailed enough) to sufficiently index the extent to which participants generated counterfactual thoughts. In light of this possibility, the absence of an effect of the thinking induction on counterfactual thinking should be interpreted with caution at this stage.

### **Study 6 - A Replication Study of the Relative Effects of Abstract versus Concrete Thinking on Post-decisional Regret**

In order to increase confidence in the findings of Study 5, the author conducted a second experiment with the goal of replicating the finding that abstract thinking leads to higher levels of post-decisional regret compared to concrete thinking. To do this, Study 6 used the same methodology used in Study 5, with some key additions and

modifications. For example, the author sought to improve on Study 5 by employing a different measure of counterfactual thinking that has been used in previous work (e.g., Kray et al., 2010; Rim & Summerville, 2014; White & Lehman, 2005). Specifically, the author decided to administer a task that would capture in real-time the number of counterfactual thoughts that participants brought to mind following the thinking induction. The task required all participants to spend some time listing all of the ways in which their circumstances could have turned out differently had they not made the decision that they now regretted. It was hypothesised that participants in the abstract condition would generate more counterfactual thoughts than those in the concrete condition. This finding, if observed, could help to elucidate one potential way in which abstract thinking could exacerbate feelings of post-decisional regret; i.e., through generating more counterfactual thoughts regarding the past decision, relative to concrete thinking. An increase in counterfactual thoughts following the adoption of an abstract thinking style could produce stronger feelings of post-decisional regret. This prediction is in line with evidence of a correlation between counterfactual thoughts and the experience of regret (Epstude & Jonas, 2015).

In addition to the inclusion of the counterfactual thought generation task, there was one other difference between Studies 5 and 6. In Study 6, the author omitted the first writing task (in Study 5) in which there was no manipulation of thinking style. The purpose of including this task in Study 5 was to demonstrate that naturally-occurring abstract thinking about a past decision (i.e., without an experimental induction) is associated with higher ratings of post-decisional regret, and through evidence of this association, offer a stronger rationale for experimentally inducing abstract thinking in the second writing task. Given that a significant association was found between abstract

thinking and post-decisional regret in the first writing task, and that the causal nature of this relationship was demonstrated in the second writing task, the author sought to replicate the causal effect of abstract thinking on regret. Accordingly, in Study 6 the author only administered the writing task that induced abstract or concrete thinking about a past decision.

On the basis of the findings of Study 5, it was hypothesised that participants in the abstract condition would report higher levels of post-decisional regret compared to those in the concrete condition. It was also hypothesised that participants in the abstract condition would produce a greater number of counterfactual thoughts than those in the concrete condition.

## **Method**

### **Participants and Design**

Participants were first-year psychology students from The University of New South Wales (UNSW Sydney) who completed the study online in return for course credit.<sup>17</sup> The author aimed for a sample size comparable to the sample size of Study 5. Due to the relatively large number of participants who failed an attention check or did not follow instructions, 114 participants were tested to have enough participants with useable data.<sup>18</sup> Using the same criteria as employed in Study 5, any participants who demonstrated poor English fluency ( $n = 1$ ) or who failed at least one of the attention checks ( $n = 31$ ) were excluded from the data set. A further 12 participants were excluded from the dataset for not following instructions for the thinking induction (e.g.,

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<sup>17</sup> Study 5 was conducted on MTurk as the author was at Yale University during its administration. Study 6 was then conducted at UNSW Sydney when the author had returned to her home university.

<sup>18</sup> The study received ethical approval from the UNSW Human Research Ethics Advisory Panel- Panel C (HREAP – Behavioural Sciences; approval number 2775).

by selecting a decision that they did not regret to begin with, as indexed by their pre-induction regret rating, or by not attempting the writing task). As was the case in Study 5, participants were not selected based on their level of depressive symptoms. The final sample consisted of 70 participants (56 females, mean age = 19.47;  $SD = 2.97$ ).

Participants were randomly allocated to either the abstract ( $n = 34$ ) or concrete ( $n = 36$ ) condition. Of the 70 participants, 20 (i.e., 28.57%) had a score of 14 or above on the DASS-21 depression subscale, and thus at minimum a moderate level of depressive symptoms according to DASS-21 cut-offs (Lovibond & Lovibond, 1995).

## Measures

**Counterfactual thought generation task.** Similar to the instructions used in previous studies (e.g., Kray et al., 2010; White & Lehman, 2014), participants were asked to “*spend some time listing all the ways that things could have turned out differently if you had not made that decision*”. Participants were instructed to write a maximum of 2-3 lines per point.

**Previously used measures.** The following measures were used exactly as described in Study 5: pre-writing task rating items, post-writing task rating items, DASS-21, RRS, Regret Elements Scale, Regret Scale, and CTNES. In this study, Cronbach’s alpha was .86, .84, and .87 for the DASS-21 depression, anxiety, and stress subscales, respectively; .93 for the RRS; .91 and .92 for the Regret Elements affective regret and cognitive regret subscales; .72 for the Regret Scale; and .72, .85, .70, and .79 for the CTNES Non-Referent Downward, Other-Referent Upward, Self-Referent Upward, and Non-Referent Upward subscales.



## **Procedure**

Participants were first asked to provide online consent, and to state their age and gender. Participants then identified a decision that they had made in the last 6 months that they now regret making. With respect to that decision, they completed the pre-writing task rating items, the writing task that induced either abstract or concrete thinking about the decision, and then the post-writing task ratings items. Participants then completed the counterfactual thought generation task, followed by the DASS-21, RRS, Regret Scale, Regret Elements Scale, and CTNES.

## **Results**

For procedural equivalence across Studies 5 and 6, all rating items administered in Study 5 were administered in the same order in Study 6. However, of the post-writing task rating items in Study 5 only the regret and mood measures were of interest. Hence, the reporting of statistics is limited to these items.

### **Baseline Checks**

A series of independent *t*-tests was conducted to check that there were no pre-existing differences between participants in the two experimental conditions in age, trait measures, or pre-writing task ratings. No differences emerged (all *ps* >.05). See Table 4.4 and 4.5 for means, standard deviations, and *t*-test scores.

Table 4.4

*Means, Standard Deviations, and T-Test Scores for Age and Trait Measures According to Condition*

	Condition					
	Abstract thinking		Concrete thinking		<i>T</i> -Test scores	
	<i>(n</i> = 34)		<i>(n</i> = 36)			
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>T</i>	<i>p</i>
Age	20.14	3.81	18.83	1.66	1.85	.07
DASS-21 depression	8.29	7.55	10.67	8.01	1.27	.21
DASS-21 anxiety	9.59	8.41	12.39	7.98	1.43	.16
DASS-21 stress	14.59	10.60	14.67	7.60	0.04	.97
RRS*	47.43	11.64	50.30	11.65	.93	.36
Regret Elements-						
affective regret	18.86	7.07	19.14	6.39	0.18	.86
Regret Elements-						
cognitive regret	20.76	5.54	21.58	5.70	0.61	.55
Regret Scale	23.06	5.27	23.97	4.77	0.76	.45
CTNES Non-ref down	12.68	3.15	12.11	2.75	0.81	.43
CTNES Other-ref up	11.44	3.77	11.64	3.77	0.22	.83
CTNES Self-ref up	12.29	3.13	13.11	2.95	1.13	.26
CTNES Non-ref up	12.59	3.24	13.28	3.30	0.88	.38

\*For 13 participants there was a computer error such that Qualtrics produced multiple responses (e.g., 2 and 3) for numerous items on the RRS. Accordingly, the author removed those participants from the analysis of the RRS. There were a remaining 30 participants in the abstract condition and 27 participants in the concrete condition.

Table 4.5

*Means, Standard Deviations, and T-Test Scores for Pre-Manipulation Ratings*

*According to Condition*

	Condition					
	Abstract thinking		Concrete thinking		T-Test Scores	
	(n = 34)		(n = 36)			
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>T</i>	<i>p</i>
Importance	5.38	1.48	5.31	1.39	0.22	.82
Thought frequency	4.71	1.34	4.69	1.33	0.04	.97
Sadness at decision	4.44	1.48	4.36	1.44	0.23	.82
Regret	4.94	1.20	4.61	1.32	1.10	.28
Turn better	4.85	1.54	4.72	1.39	0.37	.71
Turn worse	4.03	1.51	3.94	1.57	0.23	.82
Confidence	4.29	1.38	4.22	1.42	0.22	.83
Sad mood	3.24	1.48	3.19	1.55	0.11	.91
Happy mood	4.00	1.15	4.19	1.45	0.62	.54

### Manipulation Check

In order to check that the manipulations had the intended effects, an independent *t*-test was conducted to compare ratings of levels of abstractness of the writing task.

Two independent raters blind to condition coded the written responses, one of whom had also coded the written responses from Study 5. Interrater reliability was high, with an intraclass correlation of .93. As anticipated, the written responses of participants in the abstract condition was rated as significantly more abstract ( $M = 1.93$ ,  $SD = 0.66$ )

than those of participants in the concrete condition ( $M = 4.00$ ,  $SD = 0.76$ ),  $t(66) = 11.98$ ,  $p < .001$ .

There was also a significant difference between conditions in the time spent completing the writing task,  $t(40) = 2.67$ ,  $p = .01$ , such that participants in the abstract condition on average spent less time on the task (abstract:  $M = 7.31$  minutes,  $SD = 2.35$ ; concrete:  $M = 11.57$  minutes,  $SD = 5.57$ ). Hence, for all subsequent analyses this measure was entered as a covariate.

### **Effect of Thinking Induction on Post-decisional Regret**

With time spent completing the writing task entered as a covariate, a MANCOVA was conducted to assess the effect of thinking style on post-decisional regret. The general regret rating item, affective regret subscale, and cognitive regret subscale were entered as the dependent variables. The analysis demonstrated that participants in the abstract condition reported higher ratings of regret compared to those in the concrete condition, Wilks's lambda = .81,  $F(3,65) = 5.13$ ,  $p = .003$ , partial  $\eta^2 = .19$ . Participants in the abstract condition reported higher levels of regret on all three indices of regret: the general regret rating item [ $F(1,67) = 14.64$ ,  $p < .001$ , partial  $\eta^2 = .18$ ], the affective regret subscale, [ $F(1,67) = 6.78$ ,  $p = .01$ , partial  $\eta^2 = .09$ ] and the cognitive regret subscale [ $F(1,67) = 6.64$ ,  $p = .01$ , partial  $\eta^2 = .09$ ].<sup>19</sup> See Table 4.6 for means and standard deviations.

A second MANCOVA was conducted to test whether there was a potential between-condition difference in mood following the writing task. The two pre-writing task general mood ratings (sad, happy) were entered as covariates alongside thinking

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<sup>19</sup> These key findings remained unchanged when the analyses were repeated without time spent completing the writing task entered as a covariate.

induction time, with condition (abstract, concrete) as the between-subjects factor and the two post-writing task general mood ratings (sad, happy) as the dependent variables. The analysis found no between-condition difference in mood following the writing task [Wilks's lambda = .97,  $F(2,64) = 1.14$ ,  $p = .33$ ]. See Table 4.5 and 4.6 for means and standard deviations.

Table 4.6

*Means and Standard Deviations for Post-Manipulation Ratings According to Condition*

	Condition			
	Abstract thinking ( $n = 34$ )		Concrete thinking ( $n = 36$ )	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
1. Regret	4.88	1.43	3.56	1.52
2. Affective regret	19.62	8.46	15.72	7.06
3. Cognitive regret	23.97	8.39	19.44	7.23
4. Sad mood	3.21	1.43	2.97	1.42
5. Happy mood	3.50	1.35	4.17	1.54
6. Turn better	5.12	1.37	4.53	1.48
7. Turn worse	3.94	1.59	3.94	1.69
8. Confidence	4.12	1.37	4.36	1.42
9. Sadness at decision	4.29	1.36	3.56	1.44

*Note.* Raw (rather than adjusted) means reported.

**Effect of Thinking Induction on Generation of Counterfactual Thoughts**

An ANCOVA was conducted to test the hypothesis that abstract thinking would lead to the generation of more counterfactual thoughts relative to concrete thinking.

Time spent completing the writing task was entered as the covariate, with condition as the between-subjects factor and number of counterfactual thoughts produced during the counterfactual generation task as the dependent variable. Unexpectedly, there was no difference between the two conditions,  $F(1,67) = 2.81, p = .10$ . Participants in the abstract condition on average listed 3.59 counterfactual thoughts ( $SE = .24$ ); in the concrete condition participants on average listed 3.00 counterfactual thoughts ( $SE = .24$ ).<sup>20</sup>

A post-hoc examination of the direction of counterfactuals (i.e., coded upward or downward) was conducted in order to assess whether there were any between-condition differences in both types of counterfactual thought. However, this coding was only possible for 61 of the 70 participants due to the fact that for 9 participants it was unclear as to whether at least one of their counterfactual thoughts were upward or downward (e.g., *"I would have been attending a different university"*). Interrater reliability was high, with an intraclass correlation of .93 for the identification of upward counterfactuals and .91 for the downward counterfactuals.

In this subsample of 61 participants, a MANCOVA was conducted with thinking induction time entered as the covariate, condition (abstract, concrete) as the between-subjects factor and the total number of counterfactual thoughts, number of upward counterfactual thoughts and number of downward counterfactual thoughts as the dependent variables. The MANCOVA yielded a significant overall effect of condition on number of generated counterfactuals, Wilks's lambda = .76,  $F(3,56) = 5.81, p = .002$ , partial  $\eta^2 = .24$ . Participants in the abstract condition reported a greater number of total

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<sup>20</sup> There were a few instances in which participants had listed a number of counterfactuals within one statement. In such cases, two independent raters separated the multiple counterfactuals with 100% agreement to produce an accurate count of total number of counterfactuals.

counterfactuals [ $F(1,58) = 5.93, p = .02$ , partial  $\eta^2 = .09$ ], and upward counterfactuals, [ $F(1,58) = 12.08, p = .001$ , partial  $\eta^2 = .17$ ] but not downward counterfactuals [ $F(1,58) = 2.84, p = .10$ , partial  $\eta^2 = .05$ ]. See Table 4.7 for means and standard deviations.

Table 4.7

*Means and Standard Deviations for Number of Counterfactuals According to Condition*

	Condition			
	Abstract thinking		Concrete thinking	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
1. Total counterfactuals	3.53	1.26	3.06	1.49
2. Upward counterfactual	2.95	1.19	1.90	1.25
3. Downward counterfactuals	0.42	0.99	0.84	1.23

*Note.* Raw (rather than adjusted) means reported.

## Discussion

The aim of Study 6 was to replicate the key finding of Study 5 - that participants who receive an abstract thinking induction report higher levels of post-decisional regret than participants who receive the concrete thinking induction. Study 6 also included a counterfactual thought generation task to re-test the prediction that participants in the abstract condition would generate more counterfactual thoughts than participants in the concrete condition. As anticipated, abstract thinking led to higher levels of post-decisional regret than concrete thinking. However, as was the case in Study 5, the analyses did not yield support for the prediction that abstract thinking leads to more counterfactual thoughts than concrete thinking.

An exploratory post-hoc analysis on the direction of counterfactual thoughts yielded evidence to suggest that upward counterfactual thinking may play a role in increasing regret. Based on a subsample of 61 of the 70 participants whose counterfactual thoughts could be coded as upward or downward, the analyses found that participants who received the abstract thinking induction generated a greater number of *upward* counterfactuals (i.e., scenarios in which they would have been better off had they not made their decision), but not downward counterfactuals. This finding is in line with the notion that a key component of regret is the tendency to compare one's current circumstances to preferable alternatives (Broomhall & Phillips, 2018; Epstude & Roese, 2008). On a conceptual level, it seems reasonable that when thinking about a decision that one regrets making, an individual would be more likely to think about alternative circumstances in which they would be better off had they decided differently, as opposed to alternatives in which they would be worse off. Indeed, in Study 6 participants hardly generated downward counterfactuals, and perhaps due to floor effects no impact of the thinking induction emerged. It is stressed however that these speculations are based on post-hoc evidence from a subsample of participants. A future study with a larger sample should re-test this question with an a priori hypothesis regarding the differential impact of abstract versus concrete thinking on the generation of upward and downward counterfactuals.

### **General Discussion**

The goal of Studies 5 and 6 was to assess the relative effects of abstract versus concrete thinking on levels of post-decisional regret. Both studies demonstrated that participants who were instructed to think about a past decision in an abstract way reported higher levels of regret than those who were instructed to think about their



decision concretely. To the author's knowledge, no study in the published literature (either clinical or non-clinical) has compared the consequences of these two styles of thinking on post-decisional regret or counterfactual thoughts.

The author directly tested two potential reasons as to why abstract thinking, relative to concrete thinking, leads to high levels of post-decisional regret. The first possibility was that abstract thinking leads to a worsening of mood. The second possibility was that abstract thinking leads to the generation of more counterfactual thoughts, that is, thoughts on how their circumstances would be different had they not made their decision. The first possibility that abstract thinking leads to worse mood, in comparison to concrete thinking, was ruled out. That is, there was no effect of thinking induction on mood. This is consistent with the findings of a number of other studies with non-clinical (e.g., Moberly & Watkins, 2006; Watkins et al., 2008) and clinical samples of depressed individuals (Watkins & Teasdale, 2001, 2004). These studies similarly found that abstract and concrete thinking inductions did not have differential effects on mood. It was surprising, however, that there was also a no between-condition difference in counterfactual thoughts. It was expected that abstract thinking would encourage more thoughts about situational alternatives due to its general cross-situational nature.

Future lab-based replications of the present research could consider employing a more naturalistic task to index participants' generation of counterfactual thoughts. Specifically, a future lab-based study could consider requesting participants to think aloud [as opposed to write out (as was the case in Study 6)] the counterfactual thoughts that enter their mind in-real time. The use of such a task will require the use of an audio recording device so that the experimenters are able to verify that participants were

actually engaging in the counterfactual thought task, and for the raters to be able to count and code the counterfactual thoughts for upward versus downward direction.

A limitation of Studies 5 and 6 is that the studies were conducted with unselected samples. That is, participants were not selected on the basis of the level of depressive symptoms. While the findings may generalise to a sample consisting exclusively of high dysphoric or depressed individuals, future research will need to be conducted to confirm this prediction. It would be expected that a replication of this study with depressed/dysphoric individuals would similarly demonstrate that abstract thinking increases post-decisional regret as compared to concrete thinking. It is even possible that the negative effects of abstract thinking on post-decisional regret may be even more pronounced in depressed/dysphoric samples given the negative cognitive bias and low mood in this population type. That is, perhaps the interaction between depressive symptoms (e.g., feelings of worthlessness, sad mood) and the process of abstractly reflecting on the implications and consequences of a regretful decision would generate even higher levels of post-decisional regret than those observed in these studies. It is important to note however these predictions are speculative. Future research will need to confirm whether the findings observed in Studies 5 and 6 generalise to a sample consisting exclusively of high dysphoric or depressed individuals.

Future research could also consider examining whether there are qualitative differences in the content of the decisions that depressed individuals versus non-depressed individuals report as regrettable. For example, depressed individuals may have a stronger tendency to regret decisions that they did not make but could have made (e.g., a decision to avoid/not intervene/act). It is possible that for these type of decisions, abstract thinking (e.g., “*why didn’t I do something? Why can I never get myself to do it.*”

*I'm such a failure*”) may be particularly unhelpful in exacerbating levels of regret, and that concrete thinking would be especially helpful in lowering post-decisional regret

It would also be interesting to conduct a longitudinal study to compare depressed and non-depressed individuals on outcomes of post-decisional regret. Outside of the clinical field, a number of researchers have speculated that the experience of post-decisional regret can serve adaptive functions including constructive reflection and an increased likelihood of making better decisions in the future (Kray et al., 2010; Markman, McMullen, & Elizaga, 2008; Saffrey, Summerville, & Roese, 2008).

Accordingly, it is possible that in certain circumstances engaging in an abstract style of thinking about a past decision may be useful (e.g., to increase feelings of regret about a previously-made poor decision and potentially reduce the likelihood of making a similar poor decision in the future). It is plausible, however, that constructive outcomes of regret would not generalise to depressed individuals. High levels of post-decisional regret in the context of the low mood, poor self-esteem and a pervasive style of negative cognitive bias in depressed individuals may in fact generate further abstract reflection and reinforce the decision-making problems they commonly report, including but not limited to their low confidence as a decision-maker and tendency to avoid decision-making altogether (Leykin & DeRubeis, 2010; Leykin et al., 2011; Radford et al., 1986). Future research will need to be conducted to test these possibilities.

In conclusion, Studies 5 and 6 found that it is possible to influence post-decisional regret by inducing abstract and concrete thinking styles. The findings suggest that concrete thinking could be a useful strategy to incorporate as part of CBT in order to reduce levels of post-decisional regret in depression. The findings of the present research will however need to be replicated with clinically depressed samples in order

for suggestions for clinical implications to translate into practice. Given that abstract thinking and elevated levels of post-decisional regret are characteristic of depressed individuals, the findings nonetheless have the potential to inform both theoretical perspectives and clinical approaches to depression. This contribution to the literature, alongside the contributions yielded from the findings of Studies 1 to 4, will now be discussed in the General Discussion.

## **CHAPTER 5: General Discussion**

Despite evidence suggesting that abstract thinking and decision-making are both problematic and interrelated cognitive processes in depression, there has been minimal research aimed at clarifying whether abstract thinking directly contributes to decision-making difficulties. There has also been minimal research that has examined ways to alleviate decision-making difficulties in depression. Outside of the literature on decision-making in depression, there is however a growing body of evidence that inducing a concrete style of thinking alleviates many of the problematic effects of abstract thinking in depression. At the start of this thesis, the extant literature consisted of only one study (Schiena et al., 2013, Study 2) that had directly tested the relative effects of abstract versus concrete thinking on decision-making in the context of depression.

Accordingly, the current research program aimed to investigate the role of these two styles of thinking on various aspects of decision-making in depression. This chapter will commence with an overview of the findings of this thesis. The summary of findings will be presented in the context of existing literature, alongside a consideration of the ways in which the findings of earlier studies influenced the design of subsequent studies. Potential accounts of the key findings will then be explored in light of relevant existing literature. These accounts will be followed by a discussion of the theoretical implications of this thesis. Clinical implications will then be presented. Finally, the chapter will close with an acknowledgement of methodological limitations and suggestions for future research.

### **Summary of Findings**

Study 1 found that high dysphoric individuals naturally engage in more abstract than concrete thinking during decision-making, in addition to displaying more severe decision-making problems, as compared to low dysphoric individuals. Taken together these two key findings provide further support for the proposal that abstract thinking is a characteristic feature of depressed individuals (Watkins, 2016), and moreover, that abstract thinking is associated with decision-making deficits. Given that Study 1 employed a correlational design, five experimental studies were conducted next to test and confirm the prediction that abstract thinking leads to more decision-making problems than concrete thinking.

Study 2 tested the relative effects of abstract versus concrete thinking on decision-latency, operationalised as the length of time it took for participants to complete a task that they were requested to complete as early as possible. As expected, depression scores predicted longer task completion times when participants engaged in abstract thinking, but not when they engaged in concrete thinking. These findings were consistent with the results of Schiena et al. (2013) who found that high dysphoric individuals took longer to arrive at a decision when adopting an abstract as compared to a concrete thinking style. Overall, Study 2 yielded findings as anticipated. Abstract thinking interacted with depressive symptoms to contribute to longer task completion times, whereas concrete thinking did not.

Studies 3 and 4 were then conducted to test whether the pattern of findings observed in Study 2 would extend to another behavioural aspect of decision-making, namely the ability to commit to proactive choice options. Study 3 found that, as anticipated, in a sample of high dysphoric individuals concrete thinking led to higher

levels of proactivity as compared to abstract thinking. Specifically, more participants signed-up to a future 3-week study in the concrete condition compared to the abstract condition. In line with this finding, participants in the concrete condition reported higher ratings of belief in their capability to complete the 3-week study. They also provided lower ratings of indecision and stress that they experienced while deciding whether or not to sign-up.

Given that in Study 3 concrete thinking led to higher levels of proactivity when participants were presented with a standardized, prescribed decision task (i.e., whether or not to sign-up to a future study), it was unclear whether the same effects would emerge when participants were faced with a personally-relevant decision task. Study 4 was conducted to test this question and thereby increase the ecological validity and clinical utility of the findings. Study 4 tested the effects of abstract versus concrete thinking on the extent to which high dysphoric participants would self-report and display behaviours that illustrated proactivity in applying for their ideal part-time job. There was unexpectedly no impact of thinking style on participants' self-report measures of proactivity, their ratings of the extent to which they felt capable of starting and completing the job application by their proposed dates, or their ratings of the extent to which they felt motivated to apply for the job. There was however an expected pattern of effects on the behavioural measures of proactivity, comparable to the findings of Study 3. Compared to the abstract condition, significantly more participants in the concrete condition opted to stay back after the experiment to search an employment assistance website and, after leaving the lab, emailed the experimenter to later return to the lab to collect a job application assistance package. Overall, the findings of Studies 2, 3, and 4 collectively suggest that engaging in a concrete style of thinking leads to

relatively more positive effects on an individual's decision to engage in productive behaviours.

A set of two final studies was then conducted to test whether the positive effects of concrete thinking relative to abstract thinking also extend to a post-decision outcome, namely, post-decisional regret. Study 5 demonstrated that participants who were instructed to think about a past decision in a concrete way reported lower levels of regret than those who were instructed to think about their decision abstractly. Study 6 aimed to replicate these findings and to test the hypothesis that abstract thinking generates more counterfactual thoughts relative to concrete thinking. As expected, participants in the concrete condition reported lower ratings of post-decisional regret. Contrary to expectations, participants in the abstract and concrete conditions generated a comparable number of counterfactual thoughts. A post-hoc analysis on a subsample of participants revealed however that participants in the concrete condition generated fewer upward counterfactual thoughts than those in the abstract condition. Hence, Study 6 yielded some tentative post-hoc evidence to suggest that abstract thinking may increase post-decisional regret by encouraging the generation of more upward counterfactual thoughts in comparison to concrete thinking. The possibility that abstract thinking worsens mood, and that this effect on mood is responsible for the higher levels of regret, was ruled out given that in both studies there was no differential effect of the thinking inductions on mood.

To the author's knowledge, the experimental studies of this thesis were amongst the first to examine the relative effects of abstract versus concrete thinking on decision-making difficulties in the context of depression. In the broader clinical and social psychology literature, however, a considerable number of studies have examined the



relative effects of these two styles of thinking. The key findings of the studies in this thesis will now be considered in the context of this literature, and potential accounts of the key findings will be proposed.

### **Potential Accounts for Key Findings**

This thesis sought to compare the relative effects of abstract versus concrete thinking on decision-making difficulties that are common in depression. The key findings across all five experimental studies demonstrated that abstract thinking led to worse outcomes in decision-making as compared to concrete thinking. This pattern of results may be due to maladaptive effects of abstract thinking and/or adaptive effects of concrete thinking. Accordingly, the author will now explore potential accounts for the key findings according to two key questions: 1) *Why is abstract thinking unhelpful to the decision-making process?* and 2) *Why is concrete thinking helpful to the decision-making process?*

#### **Why Is Abstract Thinking Unhelpful to the Decision-making Process?**

**Abstract thinking generates unhelpful thought content.** Engaging in an abstract style of thinking during decision-making may bring about overly analytical or general representations of the scenario that are not conducive to arriving at a decision. Given its focus on capturing the overall purpose, meaning, and implications of a scenario, abstract thinking may generate information that is distracting, unhelpful, or not indicative of the steps that need to be taken in order to arrive at a decision. Indeed, Study 2 produced evidence to suggest that abstract thinking delays dysphoric individuals from completing a task in a timely manner, and Studies 3 and 4 yielded evidence to indicate that it reduces the likelihood of them opting for a proactive choice option over a non-committal one. The possibility that abstract thinking generates

unhelpful thought content will now be explored as a potential account of the findings of these three studies.

Study 2 found that depressive symptoms predicted longer task completion times in the abstract thinking condition. This may have been due to an interaction between ruminative tendencies in depression and the evaluative nature of abstract thinking. That is, higher levels of depressive symptoms may have increased participants' likelihood of ruminating on the significance, implications and potential consequences of their university performance, thereby increasing the length of time it took for them to finish the task. A large number of studies have shown that rumination is closely linked to depressive symptoms, abstract and repetitive in nature, and difficult to disengage from (Davis & Nolen-Hoeksema, 2000; Nolen-Hoeksema et al., 2008; Watkins, 2008). In addition, there is evidence that in dysphoric individuals abstract thinking reduces the ability to ignore irrelevant information during mental activities that require strategic thinking (Philippot & Brutoux, 2008), and increases decision-making time (Schiena et al., 2013, Study 2).

In Studies 3 and 4, thinking in an abstract way about the idea of participating in a future activity may have similarly led high dysphoric participants to become overly fixated on the meaning, implications, and potential consequences of committing to the activity. This style of thinking is unlikely to generate sufficient step-by-step planning, and thus also unlikely to motivate proactive behaviour. In line with this notion is evidence from neurological studies (Gilead, Liberman, & Maril, 2014; Spunt, Falk, & Lieberman, 2010). Spunt, Falk, and Lieberman (2010) found that representing a task in an abstract manner was linked to the brain's system involved in processing agency and mental states (e.g., the dorsomedial prefrontal cortex), which does not have strong links

to the motor processing regions of the brain. Representing a task in a concrete manner however was associated with areas of the brain implicated in action execution (e.g., the dorsal and ventral aspects of the premotor cortex). It is possible that this finding may in part account for the lower levels of behavioural proactivity observed in the abstract conditions in both studies.

The findings of Studies 5 and 6 suggest that abstract representations of a past decision also generate unhelpful thought content. In both studies engaging in an abstract style of thinking about a past decision yielded stronger feelings of post-decisional regret, as compared to concrete thinking. This difference in regret levels suggest that the abstract thinking induction produced thoughts that made participants feel worse about the decision that they made, relative to those who received the concrete thinking induction. Given its ability to increase over-generalisation of negative events (Van Lier et al., 2014), abstract thinking may have produced over-generalisations of the negative consequences of the regrettable decision (e.g., “my decision to quit my job will ruin every aspect of my life”). Study 6 also yielded some post-hoc evidence to suggest that abstract thinking generated more thoughts of how their life could have turned out better had they not made their decision.

Further support for the notion that abstract thinking generates unhelpful thoughts that contribute to feelings of post-decisional regret is evident from comparing the findings of Studies 3 to those of Studies 5 and 6. In Study 3, participants in the abstract and concrete conditions did not differ in the extent to which they regretted their decision to sign-up or not sign-up to participate in the 3-week study, although there was a trend towards participants in the abstract condition reporting higher levels of regret. It is possible that a significant effect did not emerge because participants were asked to

indicate the extent to which they regretted their choice almost immediately after they made it, and thus had very little time to evaluate how they felt about their decision. On the other hand, participants in Studies 5 and 6 were given 7-10 minutes to think about their decision before completing the regret rating items. Participants in the abstract condition in these experiments therefore had significantly more time to evaluate the decision scenario, generate more thought content to dwell upon, and to subsequently experience more post-decisional regret. It is also possible that the thinking inductions had an impact upon ratings of regret in Studies 5 and 6 due to the personal relevance of the decision scenarios in these two studies. Specifically, the personal relevance of the autobiographical decision scenarios in Studies 5 and 6 may have resulted in participants in the abstract condition generating considerably more thought content to dwell upon, as compared to the prescribed decision scenario used in Study 3.

**Abstract thinking generates stress and uncertainty.** Considering the analytical nature of abstract thinking, it is also possible that abstract thinking in depression engenders higher levels of decision-related stress and uncertainty. In this thesis, Study 3 was the only study that included measures of stress and indecision following the thinking induction. As expected, participants in the abstract condition reported that they experienced more stress and indecision during the decision-making process than did participants in the concrete condition. These results are consistent with the findings of Schiena et al. (2013, Study 1) who found that indecision was positively correlated with abstract thinking and negatively correlated with concrete thinking. Studies 2, 4, 5, and 6 of this thesis did not include explicit measures of stress and uncertainty. Nonetheless, a consideration of the key findings of these studies alongside results in the current literature lend support to the possibility that abstract thinking

generated feelings of stress and uncertainty that in turn contributed to the more negative decision-making outcomes observed in the abstract conditions. These possibilities will now be discussed for each study. In future studies researchers should consider including self-report and objective measures of stress and uncertainty (e.g., psychophysiological measures of stress) in order to more rigorously test the author's proposed accounts.

As previously stated, abstract thinking increases negative thinking about the future (Lavender & Watkins, 2004) as well as negative global self-evaluations (Rimes & Watkins, 2005) in depressed individuals. Accordingly, it is possible that in Study 2 the task of abstractly thinking about one's university performance in turn generated feelings of stress and uncertainty about current and/or future performance in high dysphoric participants. This experience of stress and uncertainty may have produced a 'paralysis by analysis' effect, interfering with their ability to complete the writing task in a time-efficient manner.

In a comparable manner, in Studies 3 and 4 abstract thinking may have generated feelings of stress and uncertainty that contributed to the lower rates of behavioural proactivity observed in the abstract conditions. Thinking in an abstract way about the meaning, significance, and potential consequences of engaging in the proactive choice option may have led participants to feel more stress and uncertainty around committing to that choice option. These feelings of stress and uncertainty may have rendered participants in the abstract condition more likely to default to the non-committal choice option (i.e., not signing up to the 3-week study, not staying back to peruse the employment assistance website, not picking up the job application package). Indeed, negative self-beliefs and worry were more apparent in the statements written by participants in the abstract condition during their thinking induction. For example, one

participant wrote with respect to the idea of signing up to the 3-week study: *“I worry that taking on such a huge commitment will overwhelm me with the amount of work I will need to do for the study every day”*. These worrisome thoughts may have dissuaded high dyphoric individuals from engaging in proactive behaviour. In line with these findings is evidence that worry is abstract in nature (Stober & Borkovec, 2002; Stober et al., 2000) and positively correlated with avoidance (Dickson et al., 2012).

In a similar but retrospective manner, it is also possible that in Studies 5 and 6 the abstract thinking induction produced feelings of stress and uncertainty. Specifically, it is possible that for participants in the abstract condition, reflecting on the importance, implications and consequences of their decision in turn generated feelings of stress and uncertainty about the decision that they made in comparison to other choice options that they could have taken. These feelings of stress and uncertainty may have generated a stronger sense of post-decisional regret. In line with this notion is post-hoc evidence from a subsample of participants in Study 6 suggesting that the abstract reflection generated more upward counterfactual thoughts. There is also evidence that abstract ruminative thinking makes individuals feel less confident and committed to decisions they have already made (van Randenborgh et al., 2010; Ward et al., 2003). It is important to note however that in Study 5 there was no difference between participants in the abstract and concrete conditions in the extent to which they felt confident as a decision-maker. That said, the post-manipulation rating item indexed participants' confidence as a decision-maker in general. It is possible that had the item asked participants about their likely confidence as a decision-maker when faced with a similar decision in the future, those in the abstract condition may have reported lower ratings of confidence. Future replications of this study should consider rephrasing this rating item.

### **Why Is Concrete Thinking Helpful to the Decision-making Process?**

Previous researchers (Schiena et al., 2013; Watkins, 2016) have hypothesised that in depression, thinking abstractly about the general meanings and implications that a choice option may have for one's life is likely to be less helpful than focusing on the concrete steps that an individual needs to take in order to make a decision. Specifically, they predict that it is more constructive for depressed individuals to generate context-specific mental representations of the decision scenario, aimed at inferring the 'how' details of going about the process of actually engaging in the scenario. This style of thinking might help to streamline the individual's cognitive resources to the task at hand and give more direction and clarity as to how to proceed in the decision task. In light of their predictions, the wording of the concrete thinking inductions used in this thesis aimed to induce step-by-step action-oriented appraisals of a decision scenario (e.g., "*outline the steps you would take to ....*", "*specify the steps you took... to make the decision*"). The wording of these instructions was drawn primarily from a study by Watkins and Baracaia (2002) who found that adopting an action-oriented highly specific style of concrete thinking led to more effective problem-solving, as compared to engaging in an abstract style of thinking.

It is possible therefore that in addition to abstract thinking inhibiting action in Studies 2 to 4, the step-by-step style of concrete thinking also facilitated productive behaviour. As discussed in Chapter 3, forming an implementation intention is highly similar to engaging in an action-oriented concrete style of thinking. Forming an implementation intention involves specifying when, where, and how one will engage in a task. This is comparable to the requirements of the writing tasks administered as the concrete thinking inductions in Studies 2 to 4; i.e., participants were asked to write out

their step-by-step plan of how they would perform well at university (Study 2), participate in the upcoming 3-week study (Study 3) or apply for their ideal job (Study 4). In studies that have examined the effects of forming implementation intentions, individuals who form such intentions subsequently demonstrate more goal-oriented behaviour (e.g., Armitage, 2004; Sheeran & Orbell, 1999, 2000; for a meta-analysis see Gollwitzer & Sheeran, 2006). Given that the format of generating implementation intentions mirrors the instructions of the concrete thinking inductions employed in Studies 2 - 4, it is therefore possible that the motivational effects of implementation intentions played a role in the shorter task completion times observed in the concrete condition in Study 2, and the higher levels of behavioral proactivity observed in the concrete conditions in Studies 3 and 4.

It is also possible that in Studies 5 and 6 a step-by-step retrospective appraisal of a past decision contributed to the lower levels of regret reported by participants in the concrete condition compared to the abstract condition. A concrete style of thinking might have led participants to appraise their regrettable decision in a logical step-by-step manner, streamline their cognitive resources to the context-specific scenario rather than engage in negative over-generalisations, and subsequently feel less post-decisional regret. There is indeed evidence that reflecting on negative events in a concrete manner, as opposed to an abstract manner, lowers the tendency to engage in over-generalisation (Watkins et al., 2012).

### **Theoretical Considerations**

Although conducted with non-clinical samples, the findings of this thesis are relevant to Watkins' (2004) processing mode theory of rumination. Watkins states that a processing mode characterized by high-level construals, consistent with those observed



in depressive rumination (i.e., abstract processing) results in worse outcomes than an antithetical, concrete processing mode characterized by low-level construals. This theory has been supported by a growing number of studies which have demonstrated that concrete thinking results in beneficial outcomes over abstract thinking (e.g., Watkins & Moulds, 2005; Watkins & Teasdale, 2001, 2004; Werner-Seidler & Moulds, 2012). The findings of this thesis add to this body of studies, with Studies 2 to 6 being among the first to show that this pattern of findings extends to a number of decision-relevant indices.

In addition to supporting Watkins' theory, the findings of this thesis also have the potential to extend it. Watkins (2004) has suggested a number of potential mechanisms that could be underlying the maladaptive outcomes of abstract thinking relative to concrete thinking. For example, he proposed and subsequently provided evidence that abstract thinking increases emotional reactivity to stressful events as compared to concrete thinking (Watkins, 2004). The findings of this thesis suggest a number of other potential mechanisms that may also underlie the relatively negative effects of abstract thinking, specifically in the context of decision-making. As discussed above, these include the possibility that abstract thinking generates unhelpful thought content, and that concrete thinking generates guided action plans.

Another way in which this thesis has contributed to the literature is by investigating the relative effects of abstract versus concrete thinking on actual behaviour. Investigations of the consequences of abstract versus concrete thinking in depression have to date primarily investigated their effects on cognitive or emotional indices, such as measures of self-evaluation (e.g., Rimes & Watkins, 2005) and mood (e.g., Watkins & Teasdale, 2001, 2004), rather than their effects on behaviour. The

study by Schiena et al. (2013) is one exception; in this study the length of time taken to arrive at a decision was the outcome of interest. On the basis of their findings, Schiena et al. (2013) theorised that abstract thinking may result in overly analytical representations of the decision scenario that are not conducive to arriving at a decision. The findings of this thesis extend this interpretation and suggest that relative to concrete thinking, engaging in abstract thinking may also increase the length of time it takes to complete a task as well as inhibit proactive behaviour.

Future research could clarify whether it is the step-by-step processing of concrete thinking that accounts for the observed benefits of the concrete thinking inductions in this thesis. In order to do this, in future studies researchers could include a comparison concrete thinking condition in which the induction instructions do not make explicit mention of outlining/planning steps. Instead, the instructions would request participants to write in detail about what they would see, hear, feel, and do when engaging in a future or past decision scenario. Instructions for participants to focus on experiencing the context-specific details of a scenario have been used in a number of studies to successfully induce concrete thinking (e.g., Watkins & Moulds, 2005; Watkins et al., 2008, Study 1). Evidence of benefits (e.g., shorter task completion times, greater behavioural proactivity) in the step-by-step condition only would indicate that it is the action-oriented component of concrete thinking that accounts for the relatively positive effects of concrete thinking found in this thesis. Future research of this kind will help to dismantle concrete thinking and clarify the specific ingredient/s responsible for its effects. Such findings can help to tailor the focus and delivery of interventions that encourage concrete thinking.

Also of theoretical relevance, the findings of this thesis speak to the robustness of the constructs of abstract and concrete thinking, and the variety of ways in which they can effectively be induced. In the clinical and social psychology literature, researchers have induced abstract versus concrete thinking in a number of different ways. These include word-fragment completion tasks to induce an abstract or concrete thinking interpretive bias (Watkins et al., 2008, Study 3) and manipulations adapted from Nolen-Hoeksema's rumination inductions in which participants focus on a series of abstract or concrete thinking prompts for 8 minutes (e.g., Watkins & Moulds, 2005; Watkins & Teasdale, 2001). The inductions in this thesis were primarily modelled on a study by Watkins and Baracaia (2002), in which they investigated the relative effects of abstract versus concrete thinking on problem solving in depression. Participants across all experimental studies of this thesis were requested to complete a writing task designed to induce either abstract or concrete thinking. The written responses were analysed for abstractness of thought using Stober et al.'s (2000) coding scheme, following the approach used in many of the studies by Watkins and colleagues (e.g., Watkins & Moulds, 2005; Watkins et al., 2008). The manipulation checks confirmed that the inductions had the intended effects in all five studies.

In addition to demonstrating the effectiveness of a particular induction methodology, this thesis also yielded evidence of convergent validity across different manipulation checks. It is common practice for researchers to use a single manipulation check to assess the effectiveness of their abstract versus concrete thinking inductions (e.g., Rimes & Watkins, 2005, Watkins & Baracaia, 2002; Watkins & Teasdale, 2001, 2004). Study 2 of this thesis however included the Behavioural Identification Form (BIF; Vallacher, & Wegner, 1989) as a second manipulation check. The BIF lists 25

behaviours (e.g., “*making a list*”) accompanied by 2 descriptors of the behaviour: an abstract descriptor (e.g., “*getting organized*”) and a concrete descriptor (e.g., “*writing things down*”). Participants are asked to identify which option best describes the behaviour. The proportion of abstract (relative to concrete) preferences chosen by each participant is taken to reflect their degree of abstract thinking. In Study 2, both the BIF and Stober et al.’s (2000) coding scheme yielded the same pattern of findings. It is important to note that in the present thesis, Stober et al.’s (2000) coding scheme was elaborated upon to include sample characteristics of abstract versus concrete thought drawn from the findings of researchers who have tested the differences between these two styles of thought (e.g., Watkins & Baracaia, 2002). Given that the expanded coding scheme yielded consistent results across all five studies, as well as convergence with the BIF, researchers can consider utilising the coding scheme as a reliable and valid manipulation check in future decision-making work.

### **Clinical Implications**

Whilst the current program of research was conducted with non-clinical samples, its findings nonetheless speak to clinical implications, given depressed individuals’ well-documented tendency to engage in abstract thinking (Watkins, 2016). The findings have the potential to inform the design of treatment interventions that aim to alleviate decision-making difficulties in depression. To the author’s knowledge, the findings are the first to demonstrate that high dysphoric individuals naturally engage in more abstract than concrete thinking during decision-making, and that concrete thinking yields relatively more positive outcomes on a number of different aspects of decision-making. These results highlight the potential value of designing CBT strategies that help to train depressed individuals to switch from their habitual abstract style of thinking to a

concrete style of thinking during decision-making. Given the severity and far-reaching implications of decision-making problems in depression, it is possible that equipping depressed individuals with these strategies may enhance their problem-solving capacity and, more generally, contribute to improving their wellbeing.

**Concreteness training.** The current findings reinforce the value of techniques used in existing interventions methods that train depressed individuals to adopt a more concrete, less abstract style of thinking. An intervention designed specifically to deliver this form of training is concreteness training. In a study by Watkins et al. (2009) participants who completed a concreteness training intervention first received psycho-education about the negative consequences of abstract thinking. This was followed by a face-to-face guided training session in which participants were instructed how to engage in concrete thinking in response to standardised and personally-relevant scenarios. For example, in response to the scenario of not being invited to a friend's party, participants received instructions to focus on the context-specific details of the event, how the event unfolded, and the specific steps they could take to move forward. Participants were then provided with materials to continue practicing the exercises on a daily basis. Compared to the wait-list control condition, concreteness training increased the use of concrete thinking, and decreased levels of depressive symptoms and rumination in dysphoric individuals (Watkins et al., 2009). This finding has since been replicated with depressed patients (Watkins et al., 2012). In addition, rumination-focused CBT, of which concreteness training is a key component, also reduces depressive symptoms and rumination in clinically depressed individuals (e.g., Watkins et al., 2007; see Watkins 2016, for a review).

To the author's knowledge, no study that has evaluated concreteness training in

the published literature has examined its effects on measures of decision-making. The findings of this thesis suggest that tailoring the above-stated components of concreteness training for decision-making scenarios has the potential to yield improvements in a number of decision-making outcomes.

**Decision latency and proactivity.** Withdrawal, inactivity, and low levels of motivation are all key features of depression. Hence, it is imperative to identify techniques that help depressed individuals to engage in more productive behaviour, including their ability to partake in timely and proactive behaviour (e.g., to seek and complete a course of psychological treatment). Such behaviour could be critical for their recovery from the disorder. The findings of Studies 2, 3, and 4 suggest that training depressed individuals to think about how to complete a task in a step-by-step manner might be effective in facilitating more timely task completion and more proactive behaviour, as compared to when they engage in their default style of abstract thinking. Study 3 additionally demonstrated that a concrete style of thinking produces a more positive decision-making experience by lowering stress and indecision, and increasing feelings of task capability. It is possible that such feelings in turn may help to further encourage productive behaviour. It is noted however that in Study 4 the abstract and concrete thinking inductions did not have a differential impact on participants' ratings of the extent to which they felt motivated and capable of drafting and submitting their job application by their proposed dates. Although these are important preliminary results, more experimental work is needed in this area in order to provide more conclusive clinical implications.

Concreteness training tailored to target decision-making may complement existing interventions that aim to similarly increase positive activity in depressed

individuals (e.g., goal-setting therapy, behavioural activation). There is already some evidence of the benefits of training individuals to adopt a step-by-step style of concrete thinking when presented with a task. Coote and MacLeod (2012) demonstrated that a goal setting and planning intervention led to increased wellbeing and reduced depressive symptoms of depressed individuals. MacLeod and Conway (2005) also found that the number of pre-planned steps participants identified for achieving a future goal significantly predicted the extent to which they reported feeling positive about the future. The findings of Studies 2 - 4 suggest that teaching depressed individuals to engage in concrete thinking should also facilitate behaviour.

**Post-decisional regret.** Reducing regret in dysphoric and depressed samples is an important problem to target. Regret is a significant predictor of depressive symptoms (for a meta-analysis see Broomhall, Phillips, Hine, & Loi, 2017), and an individual's ability to resolve regret has been found to predict higher levels of wellbeing, and lower levels of depression and rumination over time (Torges, Stewart, & Nolen-Hoeksema, 2008). Studies 5 and 6 found that one technique effective in reducing post-decisional regret is to teach individuals to focus on the specific steps that led them to make their decision, rather than on the reasons why they made the decision, and the resulting consequences, meanings and implications. Study 6 also yielded post-hoc evidence to suggest that this type of training might reduce the generation of upward counterfactual thoughts. Reducing the generation of upward counterfactual thoughts might help to lessen a depressed individual's ruminative tendency to compare one's current circumstances to preferable alternatives (Broomhall & Phillips, 2018). It is stressed, however, that the finding regarding upward counterfactual thoughts was based on a post-hoc analysis of a subsample of (61 out of 70) participants. Future research with a

larger sample is needed to draw more reliable conclusions about the impact of abstract versus concrete thinking on the generation of upward counterfactual thoughts.

The findings of Studies 5 and 6 lend support to the rationale for concreteness training interventions that guide depressed individuals to recall negative autobiographical events in a concrete rather than abstract way. Researchers have suggested that these interventions reduce depressive symptoms by promoting adaptive emotional processing of the negative event, which may have otherwise been avoided when engaging in abstract thinking (Neshat-Doost et al., 2013). Similarly, others have suggested that reflecting on negative events in a concrete rather than abstract manner lowers the tendency to engage in maladaptive cognitive processes closely linked to the use of abstract thinking (e.g., overgeneralisation; Watkins et al., 2012). Studies 5 and 6 provide evidence to suggest that expanding such interventions to additionally guide depressed individuals on how to think about past decisions may also lessen their experience of regret and the likelihood of generating potentially harmful upward counterfactual thoughts.

Overall, the findings of this thesis provide an initial indication of the potential clinical benefits of training depressed individuals to adopt a concrete rather than abstract style of thinking when engaging in or reflecting on a decision scenario. These benefits include completing tasks in a shorter time frame, opting for the proactive choice option as opposed to a non-committal one, and experiencing lower levels of regret over a decision that one has already made. Teaching depressed individuals to adaptively think about various aspects of decision-making should help to lessen their difficulties in this domain. Furthermore, reducing problems in one aspect of decision-making (e.g., lowering regret over a past decision) might help to alleviate problems with other aspects



(e.g., by increasing confidence to engage in a subsequent decision task). It is acknowledged, however, that follow-up replication studies with clinically depressed individuals are necessary before the above suggestions for clinical implications can be translated into practice.

### **Limitations and Avenues for Future Research**

Whilst the current body of work has the potential to inform both theoretical and clinical approaches to depression, it is notwithstanding limitations. These limitations will now be discussed, along with suggestions of ways in which to improve and build upon the current body of work.

#### **Sample Selection**

**High dysphoric samples.** Studies 1, 3 and 4 tested high dysphoric individuals. As described in Chapter 2, high dysphoric participants were tested in lieu of clinically depressed individuals on the basis of evidence that analogue and clinically depressed samples differ quantitatively rather than qualitatively, and also given that findings in high dysphoric samples are generally similar in clinically depressed individuals (Cox et al., 1999; Flett et al., 1997; Vredenburg et al., 1993). Future studies will nonetheless need to test whether the findings of the three studies generalise to clinically depressed individuals.

**Unselected samples.** Studies 2, 5 and 6 were conducted with unselected samples (i.e., participants were not selected based on their level of depressive symptoms). The author considered testing high dysphoric participants only, however insufficient numbers (Study 2:  $n = 20$ ; Study 5:  $n = 24$ ; Study 6:  $n = 20$ ) precluded statistical analysis. Despite the use of unselected samples, the findings nonetheless speak to clinical implications, given depressed individuals' well-documented tendency to engage

in abstract thinking (Watkins, 2016). Echoing the acknowledgements above with regards to the use of analogue samples, future research will still need to test the generalizability of the findings of these studies to clinical samples.

**Undergraduate samples.** The samples tested in Studies 1, 2, 3, 4, and 6 were convenience samples of undergraduate university students. It is possible therefore that the findings observed with undergraduate students may not generalise to the broader community. That is, abstract versus concrete thinking may have a different impact on decision-relevant outcomes in the wider population. It is worth noting however that whilst Study 5 was conducted with community participants who were recruited via MTurk, its methodology was replicated in Study 6 with a sample of undergraduate students, and the same pattern of findings emerged. The consistency of the findings across the two studies provides initial evidence that the effects of abstract versus concrete thinking may remain consistent across samples with different demographics, even if there are differences in the types of decision scenarios that individuals of different ages or socioeconomic status typically face or reflect upon.

**Online samples.** Studies 2, 5 and 6 were conducted online. As a result, there are certain limitations that need to be taken into account due to the absence of an in-person experimenter. One example is a participants' inability to directly seek assistance if needed. Owing to this possibility, additional efforts were put in place to ensure that the instructions of Studies 2, 5 and 6 were explicit and clear. Each study was pilot tested in order to seek feedback on the clarity of the experimental instructions. No participant in the pilot studies indicated that they had any difficulty understanding the study requirements. The feedback provided by participants during the in-person debriefing

component of Study 2 and the online feedback component of Studies 5 and 6 further confirmed that there was no ambiguity in the wording of the study instructions.

Another limitation associated with the absence of an experimenter is that participants in online studies may not be as attentive to instructions as participants in controlled lab-based studies. One specific concern related to Study 2 was whether participants would follow the online instructions to open the links and complete the two surveys in the requested order. This proved to be a minimal problem following an inspection of the time stamps recorded by the survey software. The time stamps indicated the exact time that participants opened and completed the two links and revealed that only 3 participants did not follow the instructed order. The data of these three participants were excluded from the final sample. More explicit steps were taken to assess the attentiveness of participants in Studies 5 and 6. Attention checks were embedded throughout both studies, with a strict exclusion criterion (outlined in Chapter 4) employed to remove the data of any participant who did not demonstrate sufficient attentiveness to instructions.

Finally, it is worth noting discussions in the literature which indicate skepticism about the use of crowdsourcing online platforms such as MTurk, and concerns about the quality of data it produces compared to more traditional sampling methods (Follmer, Sperling, & Suen, 2017). As described in Chapter 4, there is growing evidence that MTurk produces data that is reliable and comparable in quality and findings to other methods of recruiting undergraduate samples including in-person testing (Casler, Bickel, & Hackett, 2013; Chandler & Shapiro, 2016; Johnson & Borden, 2012; Shapiro et al., 2013). That the findings of Study 6 replicate the findings of Study 5 also provides support for the reliability and generalisability of findings of research conducted on

MTurk. Future studies will nonetheless need to confirm that the findings of Studies 2, 5 and 6 remain consistent when the same experiments are conducted in-person.

**Sample size.** Another limitation of the studies in this thesis are the relatively small samples. The sample sizes for this thesis were guided by previous studies that yielded effects of abstract versus concrete processing (e.g., Schiena et al., 2013; Watkins & Baracaia, 2002). Nonetheless, future studies could include larger samples for even greater statistical power.

### **Measurement issues**

**Absence of mood measures in Studies 2 - 4.** Studies 2, 3, and 4 did not include mood measures before and after the administration of the thinking inductions. Hence the author cannot rule out the possibility that the thinking inductions had an impact on mood such that abstract thinking worsened mood, and that this in turn led to the worse outcomes observed in the abstract relative to the concrete condition (i.e., longer decision latency and lower levels of behavioural proactivity). In light of this limitation, Studies 5 and 6 included mood ratings pre and post induction. In both studies, in addition to a number of others in the literature (e.g., Moberly & Watkins, 2006; Watkins & Teasdale, 2001, 2004; Watkins et al., 2008), abstract and concrete thinking inductions did not have differential effects on mood. It is also worth noting that in Study 2 thinking condition did not moderate the effect of depression on post-induction ratings of the extent to which participants found the writing task to be difficult, pleasant, interesting, and convenient to complete. Hence, although Study 2 did not include explicit ratings of mood, it seems unlikely that the thinking inductions moderated mood to the extent that it accounted for the between-condition difference in decision latency. Future studies should nonetheless include mood measures in order to derive more confident

conclusions.

**Self-report data.** A key methodological limitation of the current body of work is the use of self-report measures. Many of the studies in this thesis included behavioural measures, such the recording of decision latency in Study 2, the surreptitious monitoring of behavioural proactivity in Study 4, and the administration of the counterfactual thought generation task in Study 6. However, participants' experiences of the decision-making process were primarily indexed via self-report measures. Specifically, participants completed rating items that explicitly indexed the extent to which they experienced for example positive/negative affect, stress, or confidence during or following their decision-making. It is acknowledged that such self-report measures are susceptible to inaccuracy problems due to subjectivity, social desirability bias, and demand characteristics (McDonald, 2008).

Future replication and extensions of the present research should consider including more objective and robust measures; for example, using valid implicit measures of affect such as the Implicit Positive and Negative Affect Task (IPANAT; Quirin, Kazen, & Kuhl, 2009; van der Ploeg, Brosschot, Thayer, & Verkuil, 2016). Another possibility is using non-invasive physiological measures of acute decision-related stress. These include the monitoring of changes in heart rate, blood pressure, respiration activity, and salivary cortisol excretion (Basset, Marshall, & Spillane, 1987; Hjortskov et al., 2004; Lee, Kim, & Choi, 2015). Another option would be to employ electroencephalogram (EEG) or functional magnetic resonance imaging (fMRI) procedures to collect real-time data on the neural substrates involved in decision-making (Clark, Cools, & Robbins, 2004; Dixon & Christoff, 2014; Philiastides & Sajda, 2007). A future study could use fMRI to examine whether

abstract and concrete thinking induce different levels of activation in certain brain regions. There is already some evidence in support of this possibility (Gilead, Liberman, & Maril, 2014; Spunt, Falk, & Lieberman, 2010; Spunt & Lieberman, 2012). Further research of this kind might help to provide a better and more enriched understanding of the mechanisms, or more specifically the brain circuitry, that may be driving the relatively negative effects of abstract thinking.

**Single-item measures.** It is also worth noting that all studies in this thesis included one-item measures of various constructs. For example, single-item measures were administered in Study 2 and Study 3 to index feelings of regret and indecision, respectively. Whilst the use of single-items has the advantage of brevity, there is some evidence that multi-item measures possess higher levels of predictive validity (Diamantopoulos, Sarstedt, Fuchs, Wilczynski, & Kaiser, 2012). Future replications or extensions of the current research could consider including multi-item measures where available or adaptable from the literature, especially for constructs which are assumed to be comprised of multiple dimensions. For example, in future replications of Study 2 researchers could consider employing the Regret Elements Scale (Buchanan et al., 2016) instead of administering the single-item measure.

**Transdiagnostic outcome measures.** Another limitation of the studies in this thesis is that it is unclear to what extent the findings relate to depressive symptoms as opposed to more general psychological distress. Future studies could consider additional measures in order to index psychopathology more broadly - for example, a measure of psychological distress (e.g., the K10; Kessler et al., 2003) and an index of anxiety (e.g., STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) - in order to determine which measures account for more variability in the decision-making outcomes. It is

noteworthy that there is evidence that abstract rumination plays a similar role across a range of disorders including depression, anxiety and, anorexia nervosa (McLaughlin & Nolen-Hoeksema, 2011; Startup et al., 2013). Pursuing the aforementioned suggestion for future research could lead to the development of a transdiagnostic model of abstract thinking that may help to better understand the factors involved in driving its negative effects on decision-making.

### **Comparison Groups**

**Absence of a no-instruction control comparison.** It is important to acknowledge that in the absence of a no-instruction comparison condition, the author is limited to only discussing the relative effects of the two experimental inductions. Specifically, the author cannot be clear about the direction of the differential effects between engaging in each of the two experimental conditions and not receiving any instructions. That said, it is unclear as to what might constitute a suitable reference condition. A no-instruction condition in which participants are asked to freely think about doing well in university (Study 2), participating in the 3-week study (Study 3), applying for their ideal job (Study 4), or reflecting on a past decision (Study 5 and 6) may serve as a neutral reference point. However, without any specific instructions as to what to write about, participants may inadvertently default to abstract thinking. That is, a no-instruction condition might operate similarly to an abstract thinking condition given that high dysphoric individuals often naturally engage in abstract thinking (Watkins, 2016). Indeed, Watkins et al. (2008; Experiment 2) reported no difference in the ratings of the abstractness of responses to problem vignettes for participants in the no-instruction control condition and those in the abstract condition. Nonetheless,

researchers could consider adding this third condition to the experimental design of future studies.

**Absence of low dysphoric groups in Studies 2, 3, and 4.** Without having included a low dysphoric group in Studies 2, 3, and 4, the author cannot conclude that the findings of those studies are unique to individuals with high levels of dysphoria. That is, concrete thinking may facilitate proactivity in comparison to abstract thinking for all individuals, regardless of dysphoria level. That said, even if the constructive effects of concrete thinking relative to abstract thinking generalise to low dysphoric individuals, the generalisability of the findings do not detract from the value of obtaining these findings in high dysphoric individuals, given that many studies have demonstrated the decision-making difficulties present in this particular population (e.g., Leykin & DeRubeis, 2010; Leykin et al., 2011; Pietromonaco & Rook, 1987; Radford et al., 1986; van Randenborgh et al., 2010). Future replications could nonetheless consider including a low dysphoric group in order to permit conclusions about the specificity of the findings to high dysphoric individuals.

Furthermore, future research will be needed to investigate the interactive contributions of dysphoric mood and abstract thinking to decision-making outcomes. Studies 3 and 4 compared the relative effects of abstract versus concrete thinking on decisional proactivity in samples of high dysphoric individuals only. Accordingly, the experimental design of both studies precludes inferences as to whether the negative effects of abstract thinking on decisional proactivity emerge only when combined with dysphoric mood. Future research should include both high and low dysphoric samples in order to test this possibility. It should be noted however that the negative effects of abstract thinking were observed even in the unselected samples of Studies 5 and 6.



Perhaps the negative effects of abstract thinking would become more pronounced in depressed/dysphoric samples due to maladaptive interactions between engaging in an abstract style of thinking and typical symptoms of depression (e.g., a pervasive sense of helplessness, low self-esteem, sad mood). Again, future research is needed to test this prediction.

It is important to acknowledge however that there is research indicating that abstract thinking can yield positive outcomes, even in the decision-making domain. For example, there is evidence that in unselected samples of participants abstract thinking generates stronger intentions to exert self-control (Fujita, Trope, Liberman, & Levin-Sagi, 2006), a greater sense of personal power (Smith, Wigboldus, & Dijksterhuis, 2008), and an increased likelihood of engaging in behaviour that is concordant with one's personal values (Giacomantonio, De Dreu, Shalvi, Sligte, & Leder, 2010). It is possible however that these findings may not generalise to individuals with high levels of depressive symptoms. Overall, the literature on the effects of abstract versus concrete thinking on decision-making in high versus low dysphoric individuals is still in its infancy. Further research is needed to identify the circumstances in which abstract thinking generates adaptive versus maladaptive decision-making outcomes, and how dysphoric mood may influence these effects.

### **Additional Avenues for Future Research**

**Other stages of the decision-making process.** The decision-making process consists of various stages, many of which were not examined in the present thesis but are potentially subject to the effects of abstract versus concrete thinking. For example, abstract and concrete thinking may yield differential effects on the extent to which individuals seek out information during the decision-making process, the number of

choice options they self-generate when faced with an ambiguous decision task, or the ways in which they weigh up different choice options. Abstract versus concrete thinking may also influence post-decision behaviour. For instance, the exhaustive and overly analytical nature of abstract thinking in depression may lead to higher levels of decision-making avoidance or an increased need for the individual to seek out information about the alternative option/s that she/he did not choose. Given the fruitful findings of the present body of work, researchers could consider continuing this line of investigation.

**Other decision-making contexts.** In addition to examining the different stages of the decision-making process, the depression literature would also benefit from research on the various ways in which abstract versus concrete thinking can influence outcomes in different decision-making contexts. Researchers in the social psychology and management literature have drawn on Construal Level Theory (CLT, Trope & Liberman, 2003) and Action Identification Theory (*Vallacher & Wegner, 1985*) to examine the effects of abstract versus concrete thinking in a wide variety of contexts, many of which are relevant to decision-making. This literature includes studies demonstrating differential effects of these two styles of thinking on moral judgments (Lammers, 2012), negotiations (Wening Keith, & Abele, 2015), exploratory learning behaviour (Reyt & Weisenfeld, 2015), advice-taking (Reyt, Wiesenfeld & Trope, 2016), and leadership evaluation and behavior (Popper, 2013; van Houwelingen, van Dijke, & De Cremer, 2015). Decision-making researchers could consider extending this research to the depression literature in order to identify the variety of contexts in which depressive mood might moderate the influence of these two thinking styles on decision-making outcomes.

**Multi-choice decision tasks.** In Studies 3 and 4, participants were faced with only two-choice decision tasks. That is, the experimental task assessed whether or not they engaged in a particular activity (i.e., the 3-week study, perusing the careers employment website, and collecting the application assistance package). It would be interesting, however, to assess the effects (if any) that emerge when participants are presented with decision tasks with more than two choice options. These tasks could involve participants deciding which job offer to accept, social event to attend, or undergraduate course to enroll in the following semester. When faced with more than two options, it is possible that the action-oriented style of concrete thinking would yield even stronger advantages over the analytic and general style of abstract thinking.

**Experience-sampling research.** Another exciting line of research that could result in interesting intervention approaches would be to retest the hypotheses of the present research using experience-sampling methods. For example, Studies 5 and 6 demonstrated that concrete thinking was effective in lowering regret relative to abstract thinking immediately after the brief time course of a 7-10 minute thinking induction. In future studies researchers could assess how long the effects of the induction persist outside of a lab-setting. An experience-sampling method would also have scope to illustrate whether concrete thinking could still provide an advantage over abstract thinking in real-life settings, and whether it is effective in the long-term in reducing decision latency, encouraging behavioural proactivity, or decreasing the persistence of post-decisional regret. Indeed, a number of researchers have yielded insightful findings on abstract ruminative thoughts using experience-sampling methods (Kircanski, Thompson, Sorenson, Sherdell, & Gotlib, 2015; Moberly & Watkins, 2008).

### **Concluding Comments**

The overarching aim of this thesis was to investigate the relative effects of abstract versus concrete thinking on a number of decision-making outcomes known to be problematic in depression. Study 1 demonstrated that individuals with elevated levels of depressive symptoms engage in a more abstract than concrete style of thinking and report higher levels of decision-making difficulties, compared to individuals with no or low levels of depressive symptoms. The findings of Study 1 provided a strong rationale for conducting the follow-up experimental studies. These studies demonstrated that relative to abstract thinking, concrete thinking leads to more positive decision-making outcomes; specifically, in reducing task completion time (Study 2), improving behavioural proactivity (Studies 3 & 4), and decreasing post-decisional regret (Studies 5 & 6). Overall, the findings of this body of work have contributed to an increased understanding of the role that abstract thinking plays in decision-relevant difficulties that are common in depression, in addition to demonstrating the potential clinical value of encouraging concrete thinking.

Future studies are needed to extend this line of research to assess other facets of the decision-making process and to replicate current findings with clinically depressed individuals. Given the daily occurrence of decision-making, and the significant impact that decisions can have on one's life, research that identifies factors that can reduce the problems that depressed individuals face in decision-making is imperative. As the first series of studies to test the downstream effects of abstract versus concrete thinking on various stages of decision-making, the findings of this thesis open up interesting clinical avenues to explore in order to address decision-making deficits in depression.

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## APPENDICES

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### Appendix A: Depression Anxiety Stress Subscales (DASS-21)

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you *over the past week*. There are no right or wrong answers. Do not spend too much time on any statement.

**The rating scale is as follows:**

- 0 Did not apply to me at all
- 1 Applied to me to some degree, or some of the time
- 2 Applied to me to a considerable degree, or a good part of the time
- 3 Applied to me very much, or most of the time

I found it hard to wind down	0	1	2	3
I was aware of dryness of my mouth	0	1	2	3
I couldn't seem to experience any positive feeling at all	0	1	2	3
I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
I found it difficult to work up the initiative to do things	0	1	2	3
I tended to over-react to situations	0	1	2	3
I experienced trembling (e.g., in the hands)	0	1	2	3
I felt that I was using a lot of nervous energy	0	1	2	3
I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
I felt that I had nothing to look forward to	0	1	2	3
I found myself getting agitated	0	1	2	3
I found it difficult to relax	0	1	2	3
I felt down-hearted and blue	0	1	2	3
I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
I felt I was close to panic	0	1	2	3
I was unable to become enthusiastic about anything	0	1	2	3
I felt I wasn't worth much as a person	0	1	2	3
I felt that I was rather touchy	0	1	2	3

I was aware of the action of my heart in the absence of physical exertion (e.g., sense of heart rate increase, heart missing a beat)	0	1	2	3
I felt scared without any good reason	0	1	2	3
I felt that life was meaningless	0	1	2	3



### Appendix B: Ruminative Responses Scale (RRS)

People think and do many things when they feel down. Please read each of the items below and indicate whether you never, sometimes, often or always think each one when you feel sad, down or depressed. Please indicate what you generally think or do, not what you think you should think or do.

**The rating scale is as follows:**

1 = almost never

2 = sometimes

3 = often

4 = almost always

Think about how alone you feel	1	2	3	4
Think 'I won't be able to do my job if I don't snap out of this'	1	2	3	4
Think about your feelings of fatigue and achiness	1	2	3	4
Think about how hard it is to concentrate	1	2	3	4
Think "What am I doing to deserve this?"	1	2	3	4
Think about how passive and unmotivated you feel	1	2	3	4
Analyse recent events to try and understand why you are depressed	1	2	3	4
Think about how you don't seem to feel anything anymore	1	2	3	4
Think "Why can't I get going?"	1	2	3	4
Think "Why do I always react this way?"	1	2	3	4
Go away by yourself and think about why you feel this way	1	2	3	4
Write down what you are thinking about and analyze it	1	2	3	4
Think about a recent situation, wishing it had gone better	1	2	3	4
Think 'I won't be able to concentrate if I keep feeling this way'	1	2	3	4
Think "Why do I have problems other people don't have?"	1	2	3	4

Think “Why can't I handle things better?”	1	2	3	4
Think about how sad you feel	1	2	3	4
Think about all your shortcomings, failings, faults, mistakes	1	2	3	4
Think about how you don't feel up to doing anything	1	2	3	4
Analyse your personality to try to understand why you are depressed	1	2	3	4
Go someplace alone to think about your feelings	1	2	3	4
Think about how angry you are with yourself	1	2	3	4

### Appendix C: Decision-making questionnaire

*Rate the extent to which the following items are generally true.*

**The rating scale is as follows:**

1 = not at all true      2 = sometimes true      3 = often true      4 = almost always true

I feel confident about my ability to make decisions	0	1	2	3
I think I am a good decision maker	0	1	2	3
I feel so discouraged that I give up trying to make decisions	0	1	2	3
It is easy for other people to convince me that their decision rather than mine is the correct one	0	1	2	3
The decisions I make turn out well	0	1	2	3
I am not as good as most people in making decisions	0	1	2	3

When making decisions, I tire quickly	0	1	2	3
When making decisions, I feel like crying	0	1	2	3
When making decisions, I wish I could be as happy as others seem to be	0	1	2	3
When making decisions, I lose out on things because I can't make up mind soon enough	0	1	2	3
When making decisions, I am "calm, cool, and collected"	0	1	2	3
When making decisions, I feel that difficulties are piling up so that I cannot overcome them	0	1	2	3
When making decisions, I worry too much over something that really doesn't matter	0	1	2	3
When making decisions, I am happy	0	1	2	3
When making decisions, some unimportant thoughts often run through my mind and bother me	0	1	2	3
When making decisions, I take disappointments so badly that I can't put them out of my mind	0	1	2	3

*Rate the extent to which the following items are generally true.*

**The rating scale is as follows:**

1 = not at all true      2 = sometimes true      3 = often true      4 = almost always true

I avoid making decisions	0	1	2	3
I put off making decisions	0	1	2	3
I'd rather let someone else make a decision for me so that it won't be my problem	0	1	2	3
When I have to make a decision, I wait a long time before starting to think about it	0	1	2	3
I prefer to leave decisions to others	0	1	2	3
I don't like to take responsibility for making decisions	0	1	2	3
I panic if I have to make decisions quickly	0	1	2	3
Whenever I get upset by having to make a decision, I choose on the spur of the moment	0	1	2	3
I feel as if I'm under tremendous time pressure when making decisions	0	1	2	3
I can't think straight if I have to make a decision in a hurry	0	1	2	3
The possibility that some small thing might go wrong causes me to immediately change my mind about what I'm going to decide	0	1	2	3
I choose on the basis of some small thing	0	1	2	3

## Appendix D: Decision Tasks - Hypothetical Scenarios

### Hypothetical Scenario 1:

You have been working part-time for a job you started 3 months ago. However, you have been under a lot of pressure in this job, and are not enjoying your time there. To make matters worse, your supervisor is now making you do a task that was initially assigned to him- to give a presentation within a few days time to the other employees. You feel that your supervisor's expectation for you to write, prepare for, and perform the presentation is unfair- the presentation topic will require a lot of research and preparation. You are contemplating whether you will do what is asked of you, or if you should just quit your job.

### Hypothetical Scenario 2:

You have been having a tough week, and as a result, been feeling down. To pick yourself up, you decided to take a friend's advice and enrol into a sport club, where you get to play your favourite sport with the club's members on the weekends. You pay the large deposit to become a member, and the next day you arrive at the club to play the sport. You feel slightly anxious as you have not met any of the club's members before, but you bring yourself to introduce yourself to them. You notice that when you all begin to play the sport, the other members mostly play the sport among themselves, and as a result for most of the game you have had no choice but to watch them play. You are contemplating whether you should quit the club or whether you should continue participating in the upcoming weeks.

## Appendix E: Instructions for Abstract versus Concrete Coding

<p><b>Stober, Tepperwien, and Staak's (2000) Rating System for Abstract versus Concrete Thought:</b></p> <p>1 = (abstract)  2 = (somewhat abstract)  3 = (neither abstract nor concrete)  4 = (somewhat concrete)  5 = (concrete)</p>	
<p><b>Instructions for coding of abstract thought</b></p>	<p><b>Instructions for coding of concrete thought</b></p>
<p>Stober et al.'s (2000) definition of abstract thought: "<i>Indistinct, cross-situational, equivocal, unclear, aggregated</i>" (p. 221)</p>	<p>Stober et al.'s (2002) definition of concrete thought: "<i>distinct, situationally specific, unequivocal, clear, singular</i>" (p. 221)</p>
<p>The following coding instructions elaborate on Stober's definitions [drawing on findings in the literature (e.g., Watkins, 2004, 2008; Watkin &amp; Baracaia, 2002; Watkins &amp; Moulds, 2005)]</p>	
<p>Writing samples that represent the abstract end of the scale will tend to include the following features:</p> <ul style="list-style-type: none"> <li>• Global statements (e.g., assessing the past experience from a broad perspective, taking into account past and current experiences to make sense of the past)</li> <li>• Overgeneral statements (e.g. "I never get it right")</li> <li>• 'What if'/'why' questions/statements</li> <li>• Talk of general consequences (e.g., "will cause/lead to...",</li> </ul>	<p>Writing samples that represent the concrete end of the scale will tend to include the following features:</p> <ul style="list-style-type: none"> <li>• 'How'/action-oriented statement (e.g., describing steps to take/how to solve a problem)</li> <li>• Situationally-specific experiential statements (e.g., imagining how something will/has unfold(ed) in a experiential manner) <ul style="list-style-type: none"> <li>○ Note that generally talking about past or future experiences in</li> </ul> </li> </ul>

<ul style="list-style-type: none"> <li>• Talk of meaning/implications (e.g, “this would mean...”)</li> <li>• Talk of hypotheticals/non-existent/potential situations <ul style="list-style-type: none"> <li>○ Note that if they are talking about the scenarios primarily in an action-oriented way (e.g., if X happens, I will need to....”), then code it as concrete rather than abstract BUT if they are generally talking about the potential scenarios (e.g. implications, consequences) without discussing it in terms of steps that they would take to avoid/bring about the scenario, then code it as abstract</li> </ul> </li> </ul> <p>Some identifies that might appear in abstract samples:</p> <ul style="list-style-type: none"> <li>• “because...”</li> <li>• “this means..”</li> <li>• “this causes/d”</li> <li>• “I never/always”</li> </ul>	<p>terms of meaning/implications is to be considered abstract unless it is being written about in a experiential/process-focused/step-wise manner</p> <p>Some identifiers that might appear in concrete samples:</p> <ul style="list-style-type: none"> <li>• “I need to...”</li> <li>• “I will...”</li> <li>• “I saw/heard/felt/did ...”</li> </ul>
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*Note.* It is likely that passages will contain both concrete and abstract element, so make sure to take into account the relative proportion of each style of thinking (e.g. if more of the writing is concrete than abstract, then assign a 4)

## Appendix F: Study 1 Bivariate Correlations Between Post-decision Ratings

*Bivariate Correlations Between Post-decision Ratings for Personal Decision Scenarios  
Averaged Across Groups*

	1	2	3	4	5	6	7	8
1. Capable	-							
2. Stress	-.58**	-						
3. Indecision	-.56**	.80**	-					
4. Confidence	.76**	-.62**	-.71**	-				
5. Regret	-.58**	.67**	.73**	-.73**	-			
6. Uncertainty	-.66**	.71**	.77**	-.78**	.87**	-		
7. Satisfaction	.70**	-.46**	-.60**	.81**	-.59**	-.68**	-	
8. Best interest	.74**	-.55**	-.66**	.79**	-.69**	-.75**	.79**	-

\* $p < .05$  \*\* $p < .01$ *Bivariate Correlations Between Post-decision Ratings for Hypothetical Decision Scenarios  
Averaged Across Groups*

	1	2	3	4	5	6	7	8
1. Capable	-							
2. Stress	-.13	-						
3. Indecision	-.25	.82**	-					
4. Confidence	.89**	-.16	-.31*	-				
5. Regret	-.22	.75**	.82**	-.31*	-			
6. Uncertainty	-.26	.71**	.88**	-.28*	.77**	-		
7. Satisfaction	.81**	-.14	-.21	.89**	-.28	-.15	-	
8. Best interest	.63**	.35*	.28	.60**	.26	.33*	**	-

\* $p < .05$  \*\* $p < .0$



## Appendix G: Behavioral Identification Form (BIF)

Any behavior can be identified in many ways. For example, one person might describe a behavior as “typing a paper,” while another might describe the behavior as “pushing keys.” Yet another person might describe the behavior as “expressing thoughts.” We are interested in your personal preferences for how a number of different behaviors should be described. On the following pages you will find several different behaviors listed. After each behavior will be two choices of different ways in which the behavior might be identified. Here is an example:

1. Attending class  
\_\_a. sitting in a chair  
\_\_b. looking at the blackboard

Your task is to choose the identification, a or b, that best describes the behavior for you *Simply place a check mark in the space beside the identification statement that you pick. Please mark only one alternative for each pair.* Of course, there are no right or wrong answers. People simply differ in their preferences for the different behavior descriptions, and we are interested in your personal preferences. Be sure to mark your choice for each behavior. Remember to choose the description that *you personally believe* is more appropriate in each pair.

1. Making a list  
\_\_a. Getting organized  
\_\_b. Writing things down

6. Chopping down a tree  
\_\_a. Wielding an axe  
\_\_b. Getting firewood

2. Reading  
\_\_a. Following lines of print  
\_\_b. Gaining knowledge

7. Measuring a room for carpeting  
\_\_a. Getting ready to remodel  
\_\_b. Using a yardstick

3. Joining the Army  
\_\_a. Helping the Nation's defense  
\_\_b. Signing up

8. Cleaning the house  
\_\_a. Showing one's cleanliness  
\_\_b. Vacuuming the floor

4. Washing clothes  
\_\_a. Removing odors from clothes  
\_\_b. Putting clothes into the machine

9. Painting a room  
\_\_a. Applying brush strokes  
\_\_b. Making the room look fresh

5. Picking an apple  
\_\_a. Getting something to eat  
\_\_b. Pulling an apple off a branch

10. Paying the rent  
\_\_a. Maintaining a place to live  
\_\_b. Writing a check

11. Caring for houseplants  
\_\_a. Watering plants  
\_\_b. Making the room look nice

12. Locking a door  
\_\_a. Putting a key in the lock  
\_\_b. Securing the house

13. Voting  
\_\_a. Influencing the election  
\_\_b. Marking a ballot

14. Climbing a tree  
\_\_a. Getting a good view  
\_\_b. Holding on to branches

15. Filling out a personality test  
\_\_a. Answering questions  
\_\_b. Revealing what you're like

16. Toothbrushing  
\_\_a. Preventing tooth decay  
\_\_b. Moving a brush around in one's mouth

17. Taking a test  
\_\_a. Answering questions  
\_\_b. Showing one's knowledge

18. Greeting someone  
\_\_a. Saying hello  
\_\_b. Showing friendliness

19. Resisting temptation  
\_\_a. Saying "no"  
\_\_b. Showing moral courage

20. Eating  
\_\_a. Getting nutrition  
\_\_b. Chewing and swallowing

21. Growing a garden  
\_\_a. Planting seeds  
\_\_b. Getting fresh vegetables

22. Traveling by car  
\_\_a. Following a map  
\_\_b. Seeing countryside

23. Having a cavity filled  
\_\_a. Protecting your teeth  
\_\_b. Going to the dentist

24. Talking to a child  
\_\_a. Teaching a child something  
\_\_b. Using simple words

25. Pushing a doorbell  
\_\_a. Moving a finger  
\_\_b. Seeing if someone's home

## Appendix H: Information sheet for 3-week study

### *Aim*

Our research team will be running a study some time later this year that will aim to understand how different cognitive processes (specifically, different thinking styles) influence the way that individuals approach decision scenarios and later reflect on the decisions they have made.

### *Procedure*

To participate in the study, you will be asked to:

#### *1. Record in a diary across 3 weeks:*

- 6 important decision scenarios you are facing in your personal life
- Thoughts you have during the decision-making process for each scenario
- The final decision you make for each scenario

In addition to the diary, you will be provided an information sheet that briefly describes 2 different styles of thinking. You will need to regularly consult this information sheet because you will need to indicate in your diary the extent to which you adopted either thinking style when making your decision for each scenario.

It is estimated that you would be required to spend 15-20 minutes of writing per scenario (maximum of 2 hours).

*2. Come into the lab* (at level 13, Mathews Building) at the end of the 3 weeks to complete a few questionnaires and answer some questions about the decision scenarios you recorded in your diary. This lab session will take about maximum 60 minutes.

Please note that if you decide to participate, it is estimated that it will take maximum 3 hours to complete this study. You will either be credited 1 hour of course credit/hour or reimbursed \$15/hour.

## Appendix I: Study 3 Induction questions for Abstract versus Concrete Thinking

### **Abstract Thinking Condition:**

- Can you list some reasons why you would be willing to participate in this study?
- In what ways do you think participating in this study could impact you in your personal life?
- What self-insight do you think participating in this study could provide you?
- In what ways do you think this kind of research might be important to conduct for society or for specific groups of people such as those who struggle with decision-making?
- What are some potential consequences of participating in this study?
- In what ways might participating in this study influence the way you think about decisions make later on in the future?

### **Concrete Thinking Condition:**

- Write out the steps you would have to take to work this study into your schedule, alongside your other commitments (e.g., social/work/personal life etc.). This pertains to the 3 weeks of diary journaling and scheduling in the day you can come into the lab to complete the final 60 minutes of the study.
- Assume that you are able to participate in that study. What steps will you need to take in order to get to university that day (e.g., how long will the commute take, what mode of transportation will you take?)
- List the specific steps you could take to make sure you complete all the study requirements (i.e., diary-journaling requirements) you will be asked to do before coming into the lab for the final session of the study.
- You will be asked to record in a diary the thoughts you have during the decision-making process for each of the 6 decision scenarios. These thoughts should be recorded (as much as possible) in real-time i.e. recorded as close as possible to the time you have the thoughts. However, we understand you will not keep your diary with you at all times. Outline different ways you could document your thinking about the 6 decision scenarios if you don't have the diary on hand with you so that you can later transfer it to your diary.
- In addition to the diary, you will be provided an information sheet that briefly describes 2 different styles of thinking. You will need to consult this information sheet because you will be asked to indicate in your diary the extent to which you adopted either thinking style when making your decision for each scenario. Outline some ways you can make sure that you can make sure you can make note of the thinking style you adopt for each scenario without always having the information sheet on hand with you.
- Outline step-by-step what a day might look like during your participation in the 3-week study (i.e. a day during the 3-week journaling phase of this study).







### Appendix M: Counterfactual Thinking for Negative Events Scale (CTNES)

Please think of an event that occurred somewhat recently that had a negative impact on you. Take a few moments to vividly recall that experience and what it was like for you. Now, think about the types of thoughts you experienced following that undesirable event. Using the following scale, rate the frequency with which you experienced the thoughts described below.

**The rating scale is as follows:**

1 = Never; 2 = Rarely; 3 = Sometimes; 4 = Often; 5 = Very Often

I think about how much worse things could have been.	1	2	3	4	5
If only another person (or other people) had not been so selfish, this whole mess could have been avoided.	1	2	3	4	5
I think about how much better things would have been if I had acted differently.	1	2	3	4	5
I feel sad when I think about how much better things could have been.	1	2	3	4	5
I feel relieved when I think about how much worse things could have been.	1	2	3	4	5
If another person (or other people) had not been so inconsiderate, things would have been better.	1	2	3	4	5
I wish I had a time machine so I could just take back something I said or did.	1	2	3	4	5
I think about how much better things could have been.	1	2	3	4	5
I count my blessings when I think about how much worse things could have been.	1	2	3	4	5
If only another person (or other people) would have acted differently, this situation would have never happened.	1	2	3	4	5
If only I had listened to my friends and/or family, things would have turned out better.	1	2	3	4	5
I cannot stop thinking about how I wish things would have turned out.	1	2	3	4	5
Although what happened was negative, it clearly could have been a lot worse.	1	2	3	4	5
If only another person (or other people) had spoken up at the time, the situation would have turned out better.	1	2	3	4	5
I think about how much better things could have been if I had not failed to take action.	1	2	3	4	5
Although the bad situation was nobody's fault, I think about how things could have turned out better.	1	2	3	4	5